MD0626A

TTL Interface Unit

Operation Manual

Second Edition

Read this manual before using the equipment.
Keep this manual with the equipment.

Measuring Instruments Division
Measurement Group

ANRITSU CORPORATION

OCT.
1995

Document No.: M-W0608AE-2.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment.

Symbols used in manual

DANGER	This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.
WARNING	This indicates a hazardous procedure that could result in serious injury or death if not performed properly.
CAUTION	This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

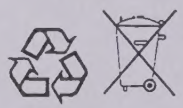
(Some or all of the following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.) The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MD0626A TTL Interface Unit
Operation Manual

November 1990 (First Edition)
September 1995 (Second Edition)

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Printed in japan

For Safety

Repair

WARNING ⚠

WARNING

1. Always refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.
   Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.
2. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision parts.

(Blank)

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories including the Electrotechnical Laboratory, the National Research Laboratory and the Communication Research laboratory, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this warranty is rendered void under any or all of the following conditions.

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to misoperation, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding and earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

If this equipment develops a fault, contact the head office of Anritsu Corporation at the address in the operation manual, or your nearest sales or service office listed on the following pages.

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SECTION 1
GENERAL

1.1 Introduction

This manual describes handling and operation of the MD0626A TTL Interface Unit, an MD6420A Data Transmission Analyzer interface unit.

It covers the parts that are unique to the TTL unit and the various measurements that can be made by inserting it into a slot in the rear of the MD6420A. When measurements are in progress, refer to the MD6420A Data Transmission Analyzer operation manual.

This manual consists of the following Sections :

Section 1 General

Section 2 Operation

Section 3 Application

Section 4 Simple Operation Checks

Section 5 Remote Control

Section 6 Principles of Operation

It also contains the following appendixes :

Appendix A Menu Reference

Appendix B Remote-Control Commands Reference

Appendix C Remote-Control Response Data Reference

1.2 Features

The MD0626A TTL Unit is an interface unit that is inserted into a slot on the rear of the MD6420A Data Transmission Analyzer.

It is used to make a variety of measurements on interfaces to ensure conformity with TTL conventions.

(1) Measurement functions

- When inserted into the MD6420A :

  Error measurements

  Frequency measurements

  Line interval measurements

  Transmission delay time measurements

  Pattern data sending and word trace

- When added with an extension unit :

  Function for long-term error-measurement-data collection and analysis (error analysis unit : MD0633A).

  Measurement of analog levels (Analog unit: MD0627A)

  Measurement of distortion (Distortion unit : MD0630A)

(2) Features

- Function testing and evaluation of the quality of transmission for the TTL interface of the device under test.
- Measurement of transmission and reception in start/stop, asynchronous, and synchronous timing modes
- Detection of bit errors and parity errors during error measurement

1.3 Composition

(1) Standard composition

The standard composition of the MD0626A is shown in Table 1-1.

Table 1-1 Standard Composition

Item	No.	Name	Qty.	Remarks
Unit	1	MD0626A TTL Interface Unit	1	Inserted into the MD6420A
Supplied accessories	2	Operation manual	1	

(2) Optional accessories

The optional accessories (sold separately) are listed in Table 1-2

Table 1-2 Optional Accessories (Sold Separately)

Order No.	Name	Remarks
J0127B	Coaxial cable	BNC-P · RG-58A/U · BNC-P, 1 m
J0386	External input probe	BNC-P · IC

1.4 Specifications

1.4.1 Operating conditions

- Operating temperature: 0° to 40 °C
- Storage temperature: −25° to 70 °C
- Operating humidity: 20 % to 90 %
- Storage humidity: 20 % to 90 %

1.4.2 Send clock signal

(1) Internal clock signal (Synchronous-ST1, Asynchronous-ASYNC, Start-stop-ST/SP)

(a) Data signal speed

- 50kb/s to 20kb/s (Variable in 5Hz steps)

  20kb/s to 400kb/s (Variable in 100Hz steps)

  512kb/s, 576kb/s, 672kb/s, 768kb/s,

  1024kb/s, 1152kb/s, 1344kb/s, 1536kb/s,

  1920kb/s, 2048kb/s, 4096kb/s, 8192kb/s

* When ASYNC or ST/SP

50b/s to 20kb/s (Variable in 5Hz steps)

(b) Accuracy

- Self oscillation : ±5 ppm
- Slave oscillation : external input is 8 kbit/s, 64 k+8 kbit/s or is slave synchronized to the received data within ±100 ppm

(2) External clock signal (Synchronous-ST2 and RT)

(a) Data signal speed

- 50 b/s to 10 Mb/s

1.4.3 Receive clock signal

(1) Internal clock signal (Asynchronous-ASYNC, Start-stop-ST/SP)

(a) Data signal speed

- 50, 75, 100, 110, 150, 200, 256, 300, 400, 500,
  512, 600, 768, 800, 1000, 1200, 1600, 1800, 2000, 2560,
  3000, 3600, 4800, 7200, 9600, 14400, 19200 b/s

(b) Accuracy

- ≦ ±20 ppm

(2) External clock signal (Synchronous-RT)

- 50 b/s to 9 Mb/s

1.4.4 Error insertion

(1) Error type

- Bit

The other error insertion functions conform to the specifications for the MD6420A main frame.

1.4.5 Start-stop synchronization

(1) START/STOP bit length — START bit: 1; STOP bit: 1, 1.5, 2

(2) Data length — 5, 6, 7 or 8 bits

(3) Parity — NON, ODD (odd parity); EVEN (even parity)

Note: ODD or EVEN parity is set depending on the number of 1's.

1.4.6 Error measurement

(1) Error measurement items

- Bit errors, parity errors

(2) Alarm counting and time measurements

- Measurement of pattern sync-loss counting and time of occurrence
- Clock-slip counting
- Measurement of power-failure

The other error measurement functions conform to the specifications for the MD6420A main frame.

1.4.7 Pattern trace function

Conforms to the specifications for the MD6420A main frame.

1.4.8 Frequency measurement and counting

Frequency measurement or counting of SD (Send Data), RD (Receive Data), ST1 (Send Timing 1), ST2 (Send Timing 2), RT (Receive Timing), or an external input signal is possible.

The frequency measurement and count functions conform to MD6420A specifications.

1.4.9 Time measurement

Measurement of the time between transition points in the SD, RD, ST1, ST2, RT, and external input signals is possible.

The time measurement functions conform to MD6420A specifications.

1.4.10 Signal line monitoring

The following signals can be monitored via LED lamps:

(1) SD, RD, ST1, ST2, RT, RD are monitored in 8-bit units.

(2) Lighting conditions

(a) SD, RD

1: Green

0: OFF

(b) ST

Send timing normal: Green

Send timing abnormal: OFF

(c) RT

Receive timing normal: Green

Receive timing abnormal: OFF

(d) Control line

Normal: Green

Abnormal: OFF

(3) Monitor output terminals

The voltages of the SD, RD, ST1, ST2, and RT signals can be monitored via the monitor terminals.

1.4.11 Dimensions, weight, and power consumption

Dimensions: 30W × 145H × 230D mm

Weight: ≦ 0.5 kg

Power consumption: ≦ 12 VA

SECTION 2
OPERATION

2.1 Precautions before Use

This unit has been thoroughly tested and inspected at the factory. On delivery, inspect the box for damage before opening it.

After opening the box, inspect the unit and verify the type and number of accessories.

If the unit has been damaged during shipment, please contact Anritsu.

- Operating environment

The MD0626A is used by inserting it into a slot on the rear of the MD6420A. It operates normally at an ambient temperature of 0° to 40° C. However, do not use it where :

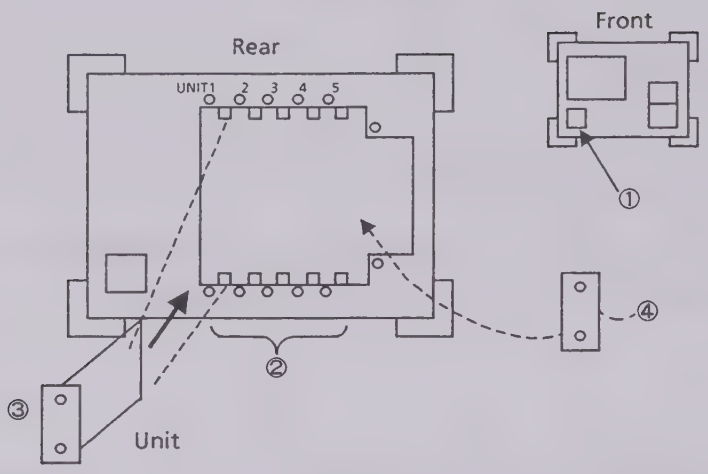
1. Vibration is severe.
2. It is damp.
3. It is dusty.
4. There is exposure to direct sunlight.

To ensure that the unit operates normally for a long time, it should be used at ambient room temperatures in addition to the above conditions.

This unit is designed to be used only with the MD6420A Data Transmission Analyzer. Never use it with other equipment since it may be damaged.

Although the shape of this unit is compatible with the rear panel slots of the MD6410A Data Transmission Analyzer, it cannot be used with the MD6401A.

2.2 Inserting and Removing Unit



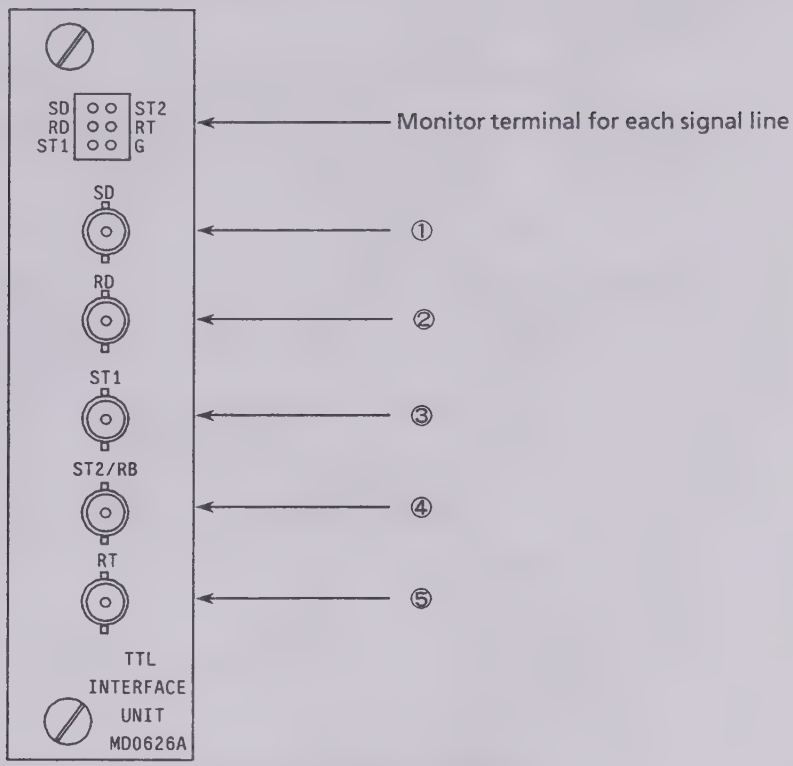
① Before inserting or removing this unit, turn the front-panel power switch POWER OFF.

② This unit can be inserted into any position, from UNIT1 to UNIT5.

③ To insert the unit, align the edges of the unit PC board along the top and bottom guide rails and push it in until it is firmly seated, then tighten the screws at the top and bottom. If the unit is not inserted and fastened properly, it may not operate correctly.

④ Cover empty slots with blank panels.

2.3 Explanation of Front Panel



No.	Label	Explanation
①	SD	Send data output terminal
②	RD	Receive data input terminal
③	ST1	Send internal self-oscillating clock output terminal
④	ST2/RB	Send external clock input terminal/Receive byte sync signal input terminal
⑤	RT	Receive external clock input terminal

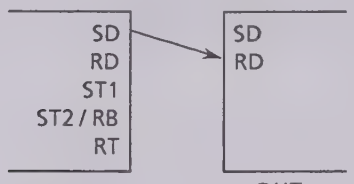
Input ④ is selected by an internal dip switch.

2.4 Connecting to the Device under Test (DUT)

The DUT connections and timing that can be set on the INTERFACE screen are shown below.

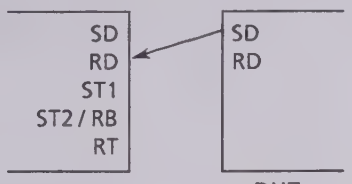
(1) Synchronous (ST/SP mode)

① When using the send function



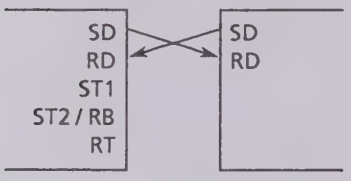
SEND TIMING = ST / SP

② When using the receive function



RECV TIMING = ST / SP

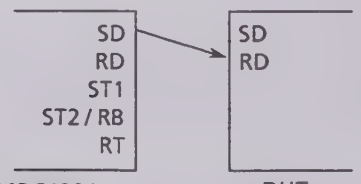
③ When using both send and receive functions



SEND TIMING = ST / SP
RECV TIMING = ST / SP

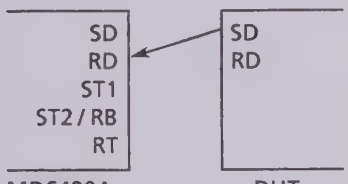
(2) Asynchronous mode (ASYNC mode)

① When using the send function



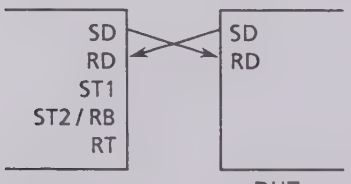
SEND TIMING = ASYNC

② When using the receive function



RECV TIMING = ASYNC

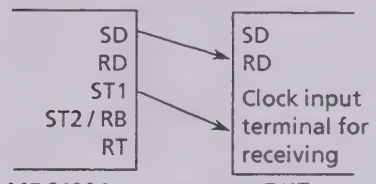
③ When using both send and receive functions



SEND TIMING = ASYNC
RECV TIMING = ASYNC

(3) Synchronous (ST1 mode) (The internal clock source is used for sending)

① When using the send function

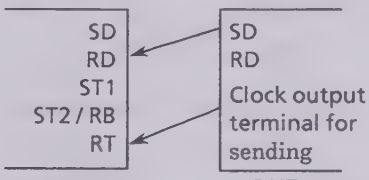


MD6420A + DUT

MD0626A

SEND TIMING = ST 1

② When using the receive function

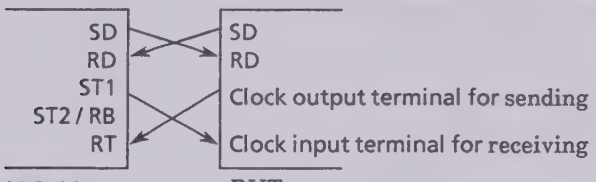


MD6420A + DUT

MD0626A

RECV TIMING = RT or RT (INV)

③ When using both send and receive function



MD6420A + DUT

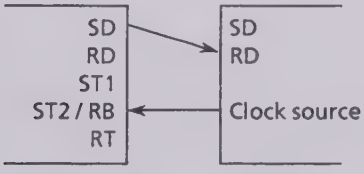
MD0626A

SEND TIMING = ST1

RECV TIMING = RT or RT (INV)

(4) Synchronous (ST2 mode) (The external clock source is used for sending)

① When using the send function

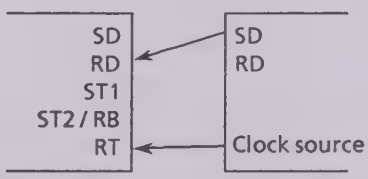


MD6420A + DUT

MD0626A

SEND TIMING = ST2 or ST2 (INV)

② When using the receive function

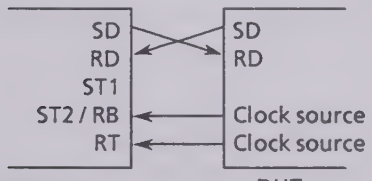


MD6420A + DUT

MD0626A

RECV TIMING = RT or RT (INV)

③ When using both send and receive functions



MD6420A + DUT

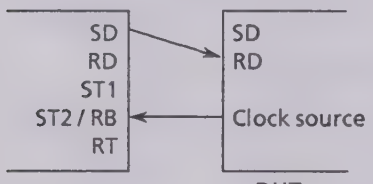
MD0626A

SEND TIMING = ST2 or ST2 (INV)

RECV TIMING = RT or RT (INV)

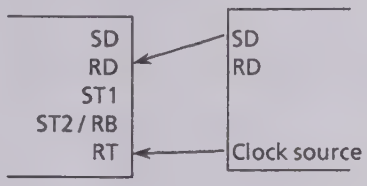
(5) Synchronous (RT mode) (The external clock source is used for sending)

① When using the send function



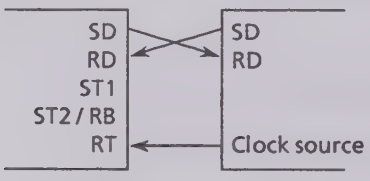
MD6420A + DUT
MD0626A
SEND TIMING = RT

② When using the receive function



MD6420A + DUT
MD0626A
RECV TIMING = RT or RT (INV)

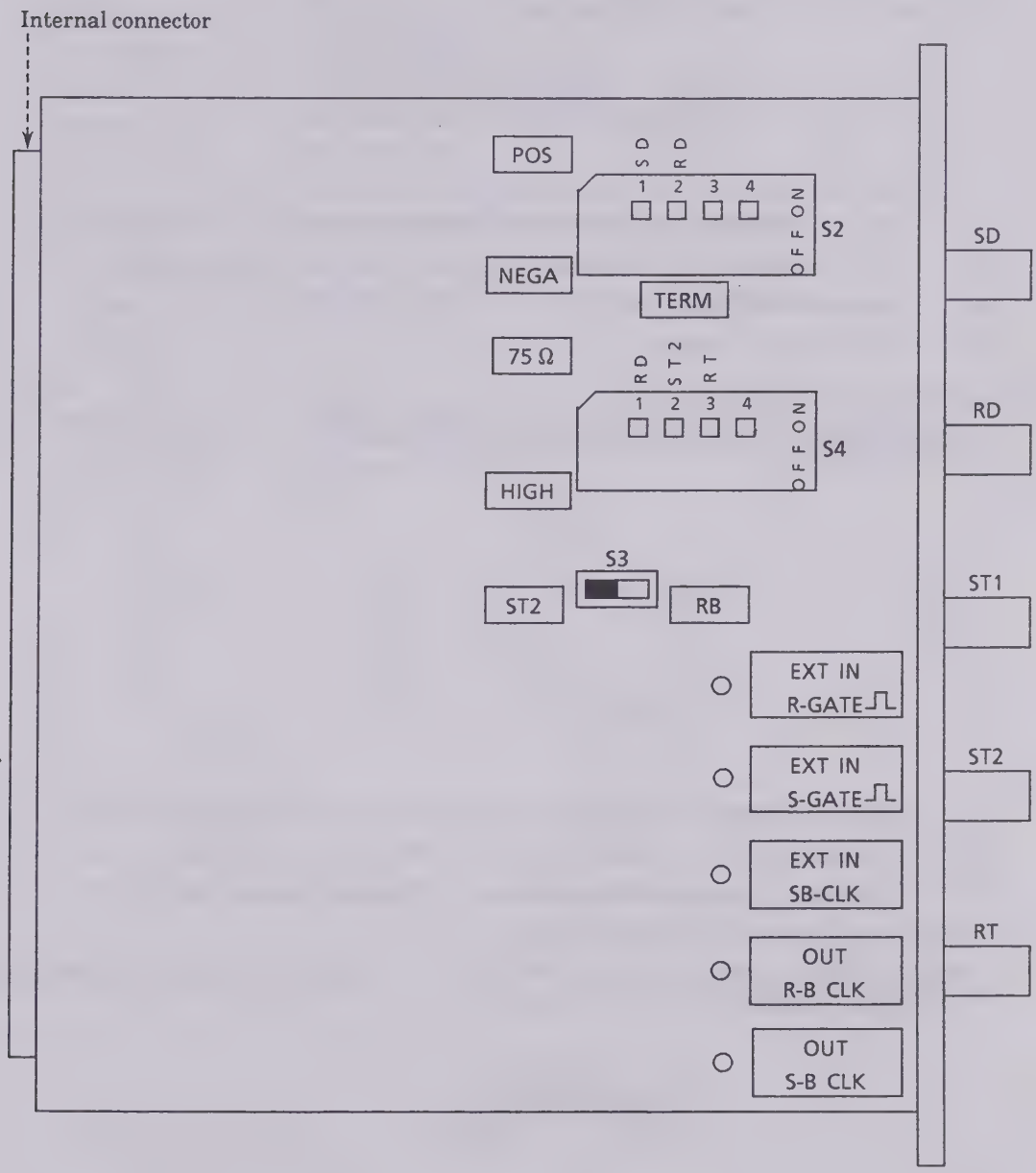
③ When using both send and receive functions



MD6420A + DUT
MD0626A
SEND TIMING = RT
RECV TIMING = RT or RT (INV)

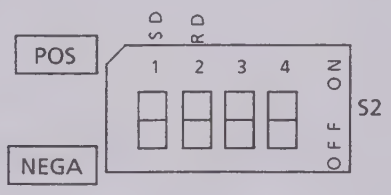
2.5 Setting Internal Switches and Internal Check Terminals

The diagram below shows the location of internal switches and terminals in this unit.



(1) Inverting the Polarity of the input/output signal

The polarity of the input/output signal can be inverted with the S2 dip switch.



SD : Sets the pattern signal output from the MD0626A SD terminal to POS or NEGA polarity.

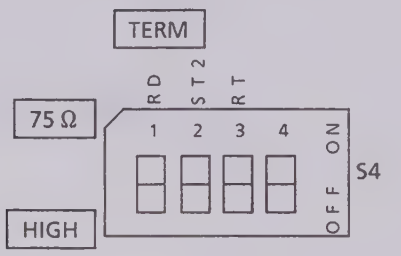
RD : Sets the signal input to the MD0626A RD terminal to POS or NEGA polarity.

POS : Non-inverted signal polarity.

NEGA : Inverted signal polarity.

(2) Setting the input impedance

The impedances of the MD0626A input signals RD, ST2, or RT can be set to either HIGH or 75Ω with the S4 dip switch



RD : Sets the input impedance of the signal from the RD terminal to either HIGH or 75Ω.

ST2 : Sets the input impedance of the signal from the ST2/RB terminal to either HIGH or 75Ω

RT : Sets the input impedance of the signal from the RT terminal to either HIGH or 75Ω

(3) Switching the input signal of ST2/RB terminal

Either the ST2 (send external clock) or RB (receive byte sync signal) signal can be selected for input to the ST2/RB terminal via the S3 dip switch.

ST2 : Set when the signal which is input from the ST2/RB terminal is ST2.

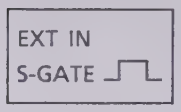
RB : Set when the signal which is input from the ST2/RB terminal is the receive byte sync signal. However, this can be used only when the receive timing signal is ST1.

(4) Internal check terminals

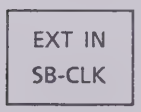
There are five terminal located on the PC board of this unit. They are used in conjunction with an external probe to monitor TTL input and output signals (See Table 1-2)

①

... Used when receive signal gating is required.
The receive signal is enabled only when the signal input from this terminal is high.

② 

... Used when send signal gating is required.
The send signal is enabled only when the signal input from this terminal is high.

③ 

..... This is a terminal into which the byte sync send signal is input .
The signal is disabled when send timing is ST/SP.

④

..... The RB CLK signal is output via the RB terminal

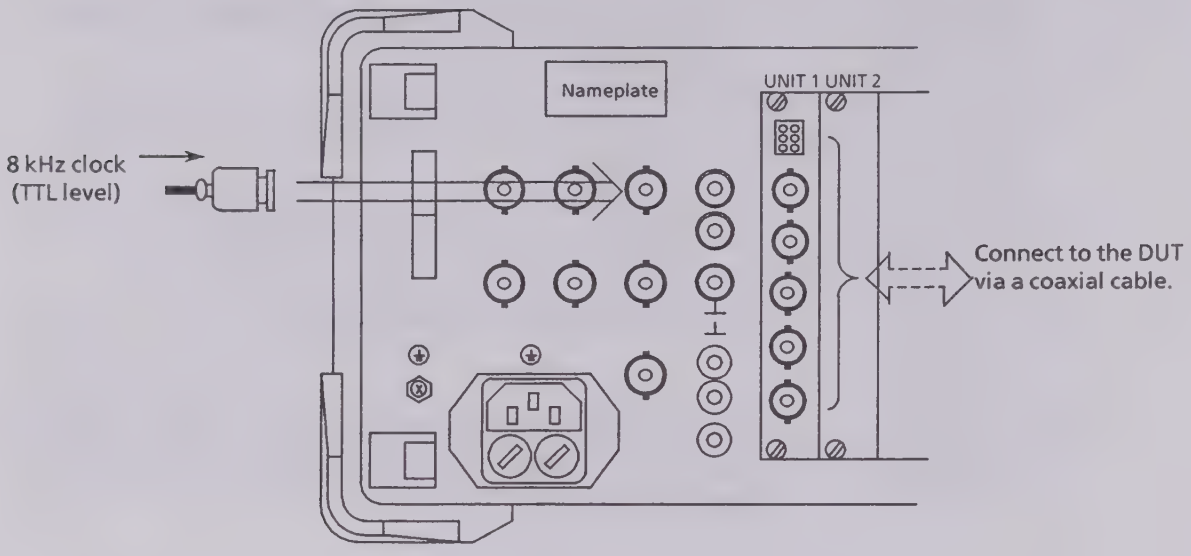
⑤

..... Output the byte sync send signal. (The sync send signal is the signal input from the EXT IN SB-CLK terminal or the byte sync send signal when the ST/SP mode is enabled.)

2.6 Using an External Clock Source for the Send-signal

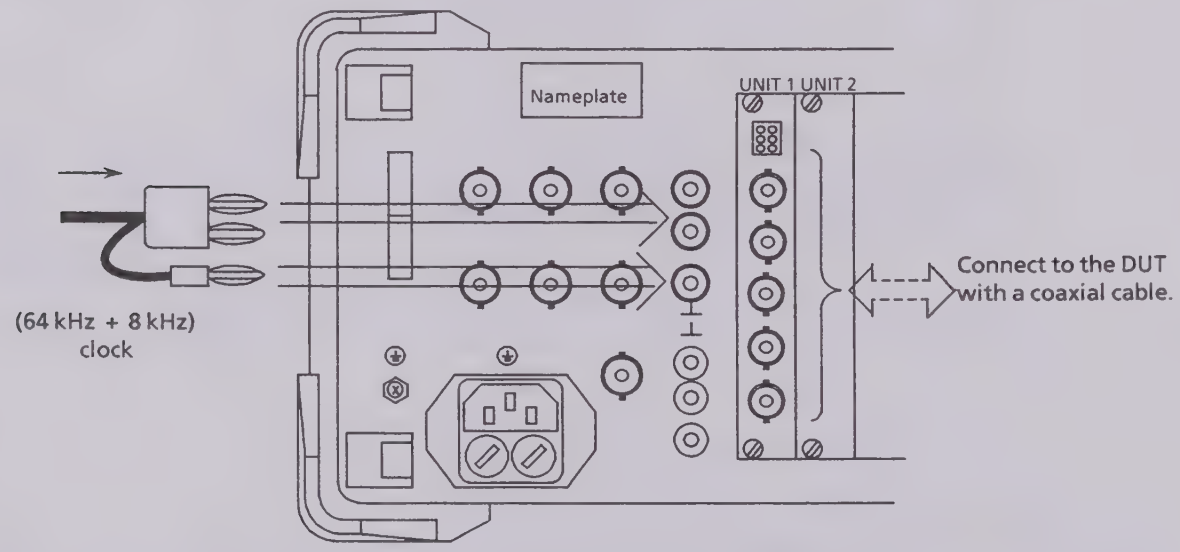
An External clock can be used instead of the MD6420A internal clock source as the send clock source.

1. Slave synchronization to an external 8 kHz clock (The specified-bit rate is generated by internal source.)



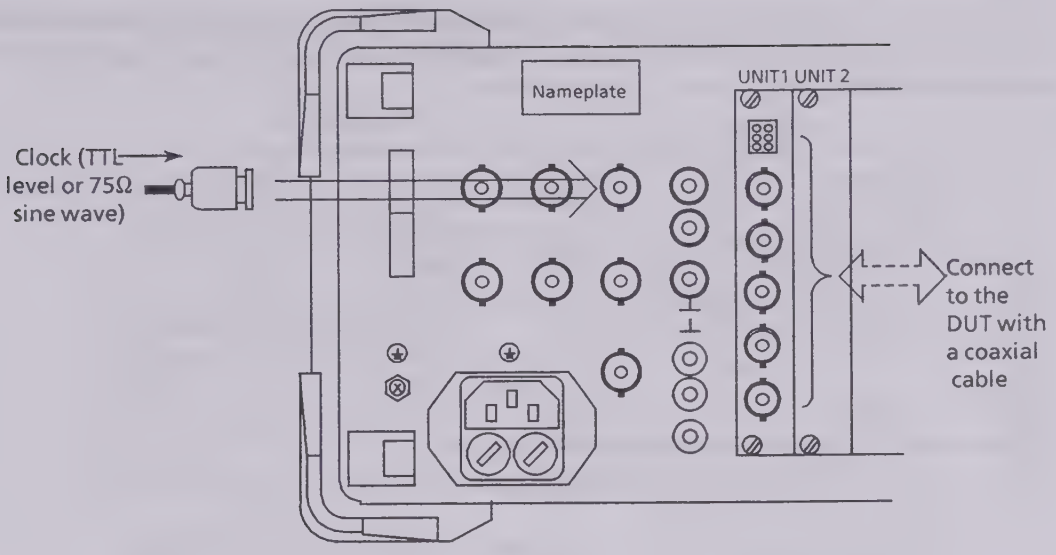
- Connect to the 8 kHz signal source to the rear-panel EXT1 connector via a coaxial cable.

2. Slave synchronization to an external (64 kHz + 8 kHz) clock source. (The specified-bit rate is generated by the internal clock source.)



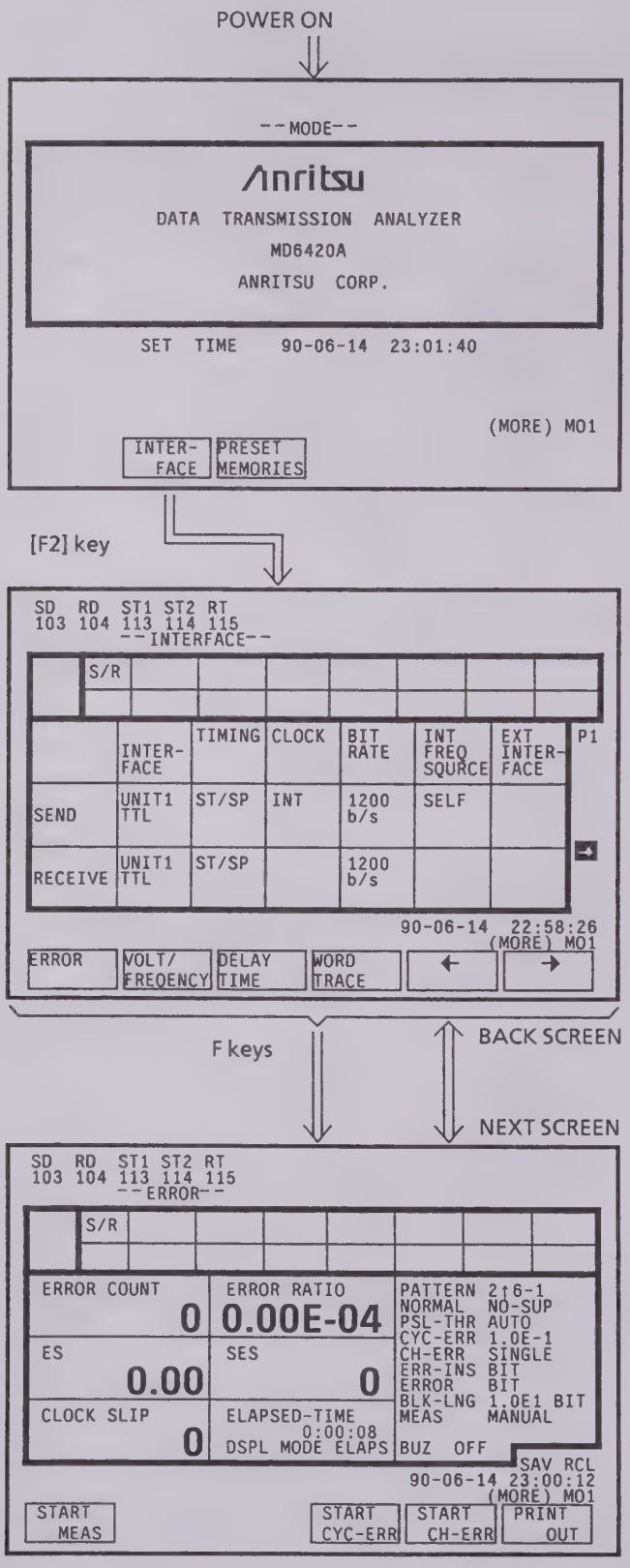
- Connect the (64 kHz + 8 kHz) signal source to the rear-panel EXT2 connector with a balanced cable.

3. External clock source for send signal



2.7 Outline of Measurement Operation

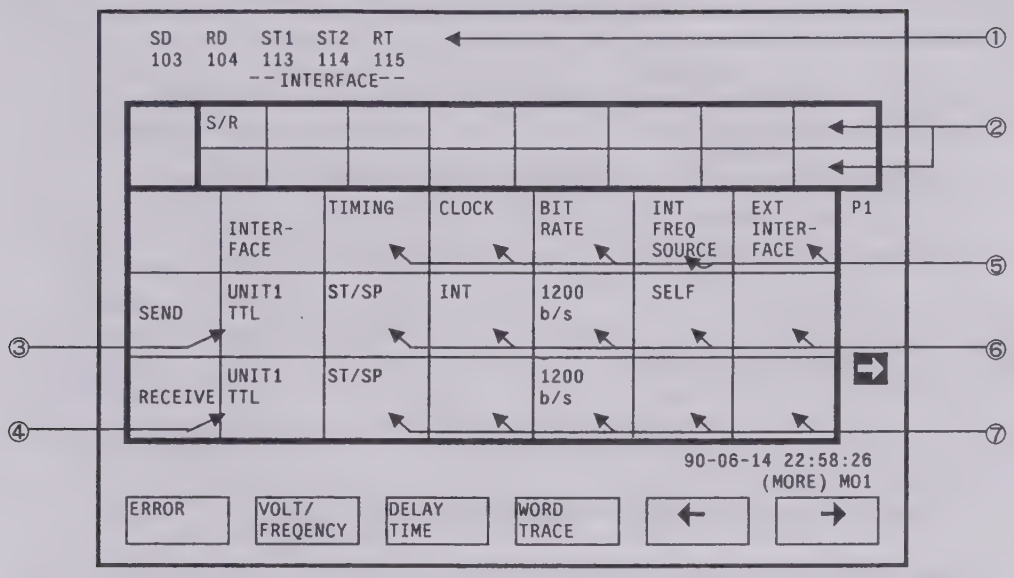
Before beginning measurements, first set the send and receive interface conditions for the DUT via the INTERFACE screen. Then set the appropriate measurement conditions on the measurement screens and initiate measurement.



- Press [F2] to display the INTERFACE screen.
- Using the CURSOR, MODIFY, and F (soft) keys, set the send and receive interface conditions for the DUT.
- After the cursor goes off, press the appropriate F key to display the desired measurement screen.
- The MD0626A can be used as either the send or receive interface unit, or as both.
- Use the CURSOR, MODIFY, and F keys to set the send signal conditions, measurement conditions, etc.
- After the cursor goes off, select measurement start/stop, etc.
- For an operational description of the ERROR and other measurement screens, refer to the MD6420A operation manual.

2.8 INTERFACE Screen

The composition of the INTERFACE screen is shown below.



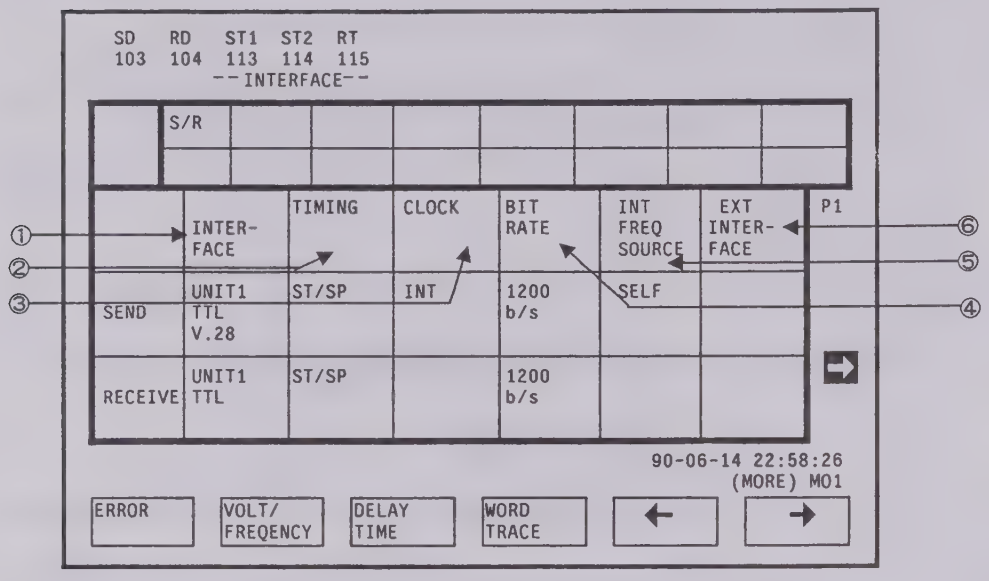
No.	Label	Item	Explanation	Setting	
①		Name of signal being monitored by LED	Displays names and connection circuit numbers correspoding to signal lines and alarm signals being monitored by LEDs.	×	
②	S/R SND RCV	Signal line and alarm signal setting	Displays name of signal and the alarm signal setting.	○	Note
③	SEND INTERFAC E	Send interface unit setting	Displays number and name of unit selected as send interface.	○	
④	RECEIVE INTERFAC E	Receive interface unit setting	Displays number and name of unit selected as receive interface.	○	
⑤		Interface setting item name	Displays send/receive interface setting. The setting depend on the selected unit.	×	
⑥		Send interface settings	The send interface settings depend on the type of send interface being used.	○	
⑦		Receive interface settings	The receive interface settings depend on the type of receive interface being used.	○	

Note : The signal lines and alarm signals cannot be set for this TTL unit.

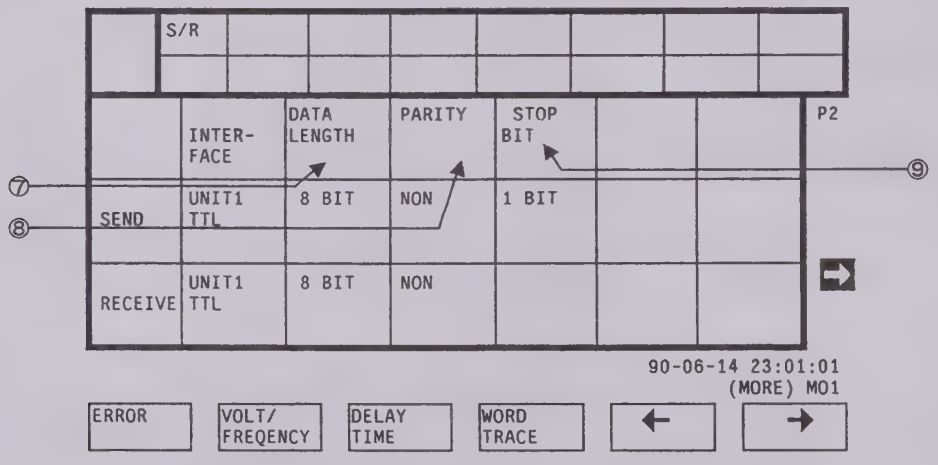
2.9 TTL Unit Interface Conditions

The TTL unit interface conditions can be set on the INTERFACE screen as shown below.

(1) Page 1



(2) Page 2



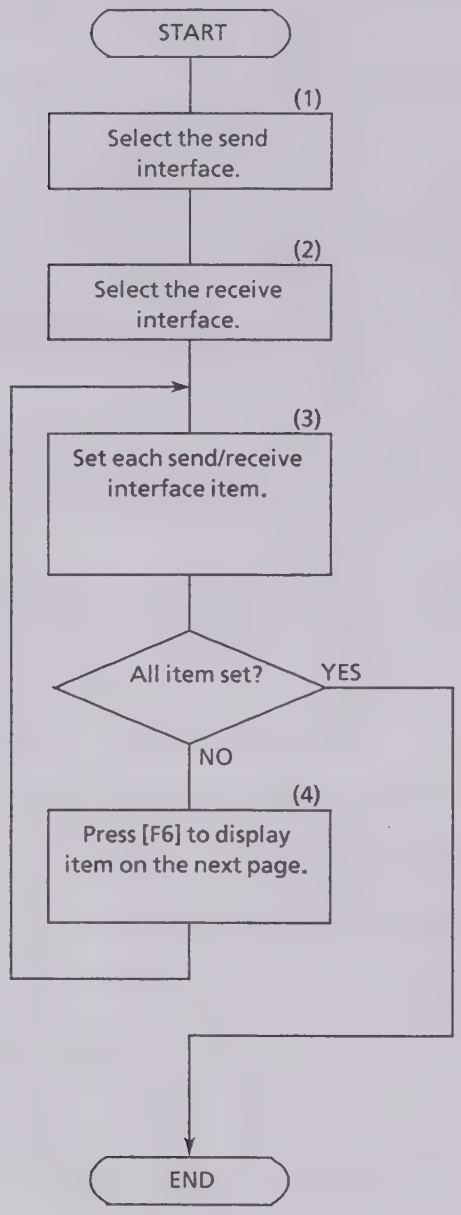
Note : These display examples assume that both the send and receive sides of the MD0626A are being used.
The display location of each item and the number of pages differ with the type of interface unit.

No.	Label	Name	Send	Receive	Explanation
①	INTER-FACE	Interface unit	○	○	Send/receive interface unit No. and name
②	TIMING	Send/receive signal timing	○	○	Send and receive signal timing.
③	CLOCK	Send signal clock	○		Source of send clock signal
④	BIT RATE	Bit rate	○	○	Clock bit rate when TIMING is ASYNC, ST/SP or ST1
⑤	INT FREQ SOURCE	Internal-clock slave signal type for send signal	○		Slave clock signal when ③ CLOCK is set to INT
⑥	EXT INTER-FACE	External-clock input interface type	○		Type of external-clock input interface when ③ CLOCK is set to EXT
⑦	DATA LENGTH	Data length	○	○	Data length (number of bits /data byte) when ② TIMING is ST/SP
⑧	PARITY	Parity	○	○	Parity when ② TIMING is ST/SP
⑨	STOP BIT	Stop-bit	○		Stop-bit when ② TIMING is ST/SP

- Subsequent items are set in accordance with the previously-set items.
- The cursor skips over the display areas of items that cannot be set.

2.10 Setting the Interface Condition

(1) Basic setting procedure



Step

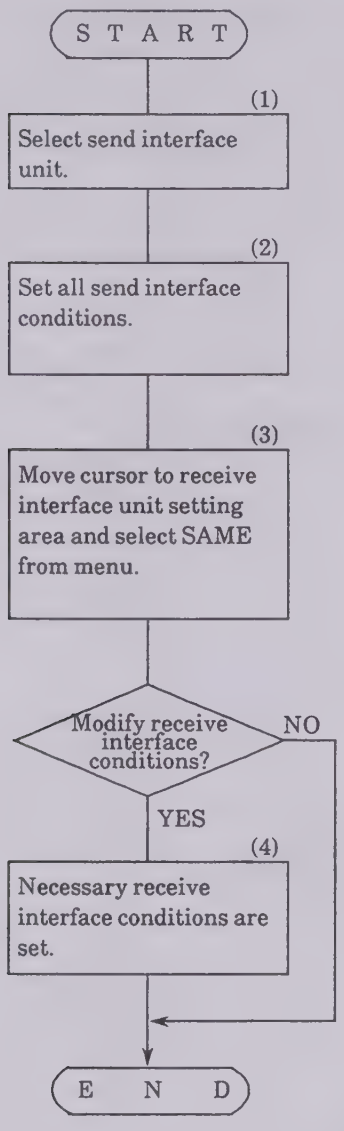
(1) When the CURSOR key is pressed once in the cursor-off state, the cursor is displayed in the send interface setting area. Select the unit corresponding to the required send interface from the menu via the F (soft) keys.

(2) When the CURSOR key is pressed once while in state (1) above, the cursor is displayed in the receive interface setting area.
Select the receive interface unit with the F (soft) keys, as described above.

(3) Operate the CURSOR, MODIFY, and F keys to set or modify each interface item currently being displayed.

(4) When is displayed at [F6], press [F6]. If it is not displayed, press [CURSOR OFF], followed by [F6].

(2) Simple setting procedure when using the same send/receive conditions



Step

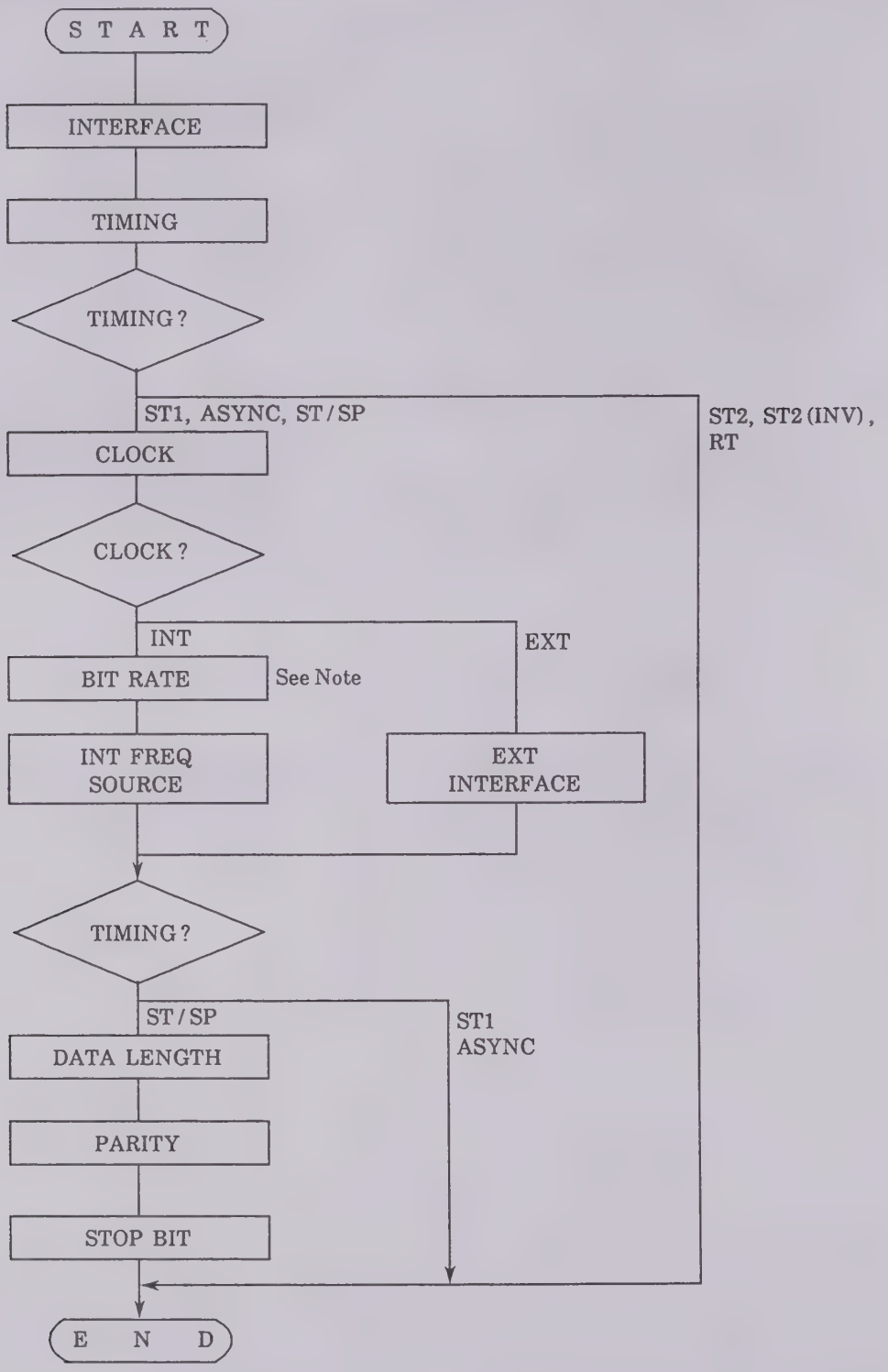
(1) Select the send interface unit as described in step (1) of paragraph (1) in the previous page.

(2) Use the CURSOR, MODIFY, and F (soft) keys to set or modify all the send interface conditions.

(3) Move the cursor to the receive interface unit setting area and press [MORE] to display the next page of the menu. Press [F1] (SAME) to set the receive interface conditions to the same conditions as the send interface conditions.

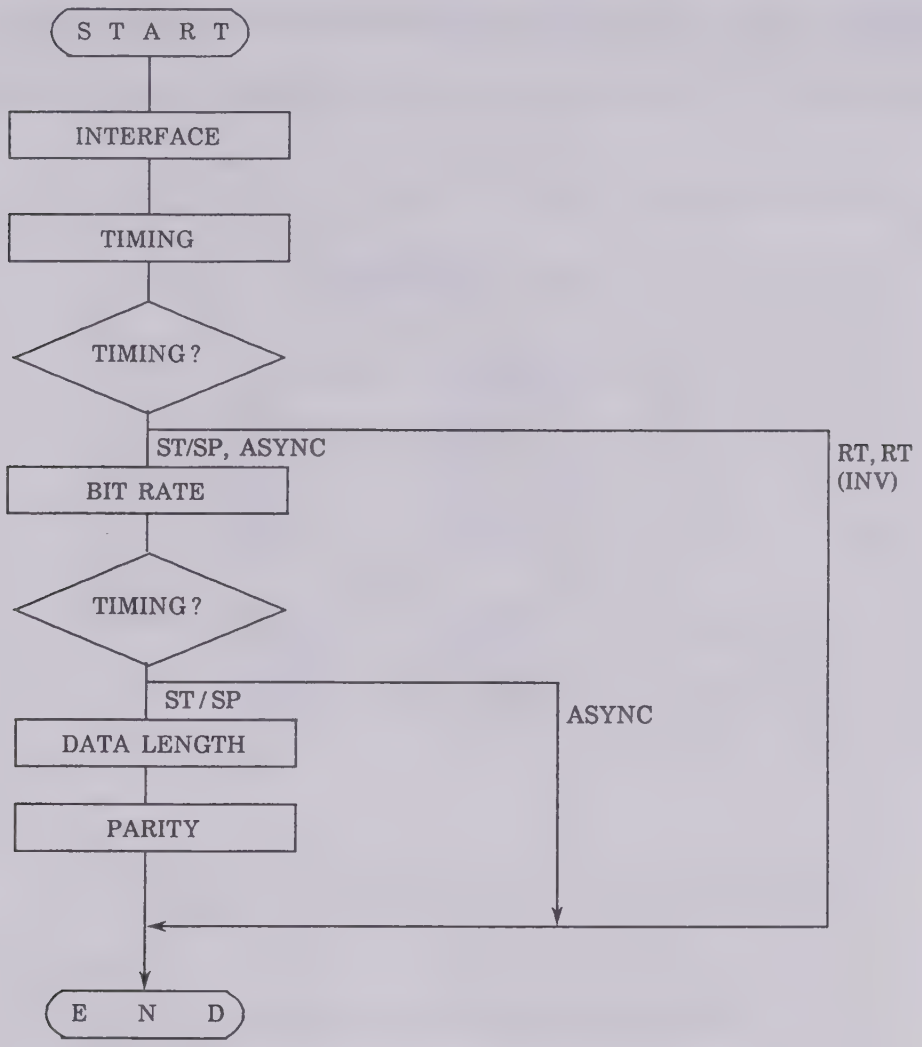
(4) Modify any necessary items as described in step (2) above.

2.11 Setting the TTL Unit Send Conditions



Note: When send timing is ST1, the send bit rate can be set from 50 to 20,000 b/s range in 5 b/s steps, or from 20 to 400 kb/s range in 0.1 kb/s steps, or to 512 k, 576 k, 672 k, 768 k, 1024 k, 1152 k, 1344 k, 1536 k, 1920 k, 2048 k, 4096 k, 8192 kb/s.
When send timing is ST/SP or ASYNC, the send bit rate can be set from 50 to 20,000 b/s range in 5 b/s steps.

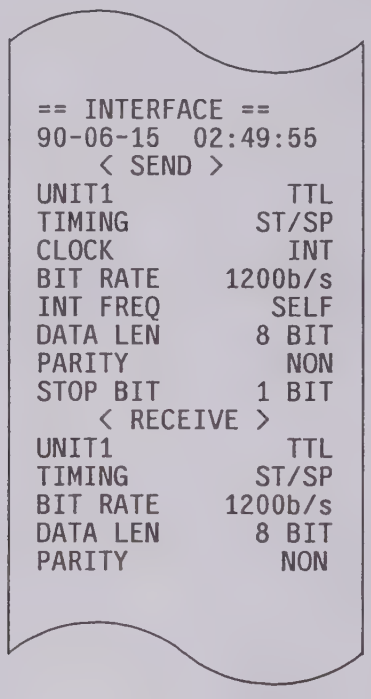
2.12 Setting the TTL Unit Receive Conditions



2.13 Setting the Conditions for Printing the Interface Settings

The interface settings can be printed by pressing [F6] (PRINT OUT) on page 2 of the INTERFACE screen while the cursor is disabled.

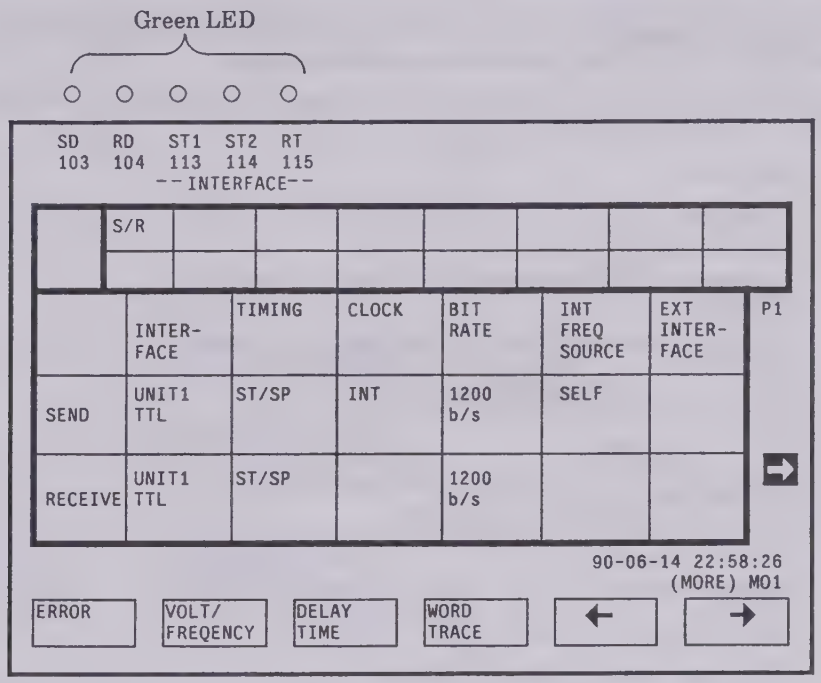
A sample print out (in which the conditions are set in accordance with paragraph 2. 8) is shown below.



```
== INTERFACE ==
90-06-15  02:49:55
    < SEND >
UNIT1              TTL
TIMING           ST/SP
CLOCK              INT
BIT RATE      1200b/s
INT FREQ          SELF
DATA LEN        8 BIT
PARITY             NON
STOP BIT        1 BIT
    < RECEIVE >
UNIT1              TTL
TIMING           ST/SP
BIT RATE      1200b/s
DATA LEN        8 BIT
PARITY             NON
```

2.14 Monitor LED Display

The statuses of the TTL interface signal-lines can be monitored by the LEDs on the INTERFACE and measurement screens.



① SD (103)

Transmit (Send) data. This monitors the send signal from the MD0626A.
1: Lit 0: Not lit

② RD (104)

Receive data. This monitors the receive signal to the MD0626A.
1: Lit 0: Not lit

③ ST1 (113)

Transmit (Send) signal element timing. This LED monitors the signal element timing information sent by the MD0626A to DUT.
ON: Lit OFF: Not lit

④ ST2 (114)

Transmit (Send) signal element timing. This LED monitors the signal element timing information received by the MD0626A from the device under test.
ON: Lit OFF: Not lit

⑤ RT (115)

Receive signal element timing. This LED monitors the signal element timing information received by the MD0626A from the DUT.
ON: Lit OFF: Not lit

The monitor LEDs indicate the condition of the specified signal-line.

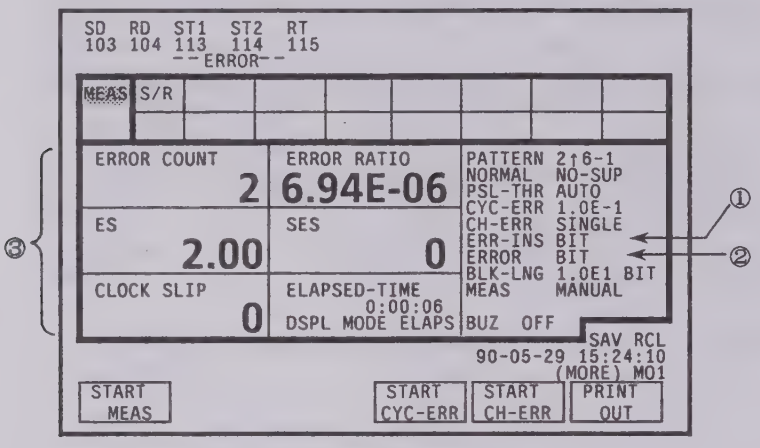
2.15 Measurement Conditions (only Items Unique to the MD0626A)

2.15.1 Error measurement

As regards error measurements, the following measurement conditions and items are unique to the MD0626A. Other items are referred to as common items.

For a description of the common items and error measurement operations, refer to the MD6420A operation manual.

(1) ERROR screen

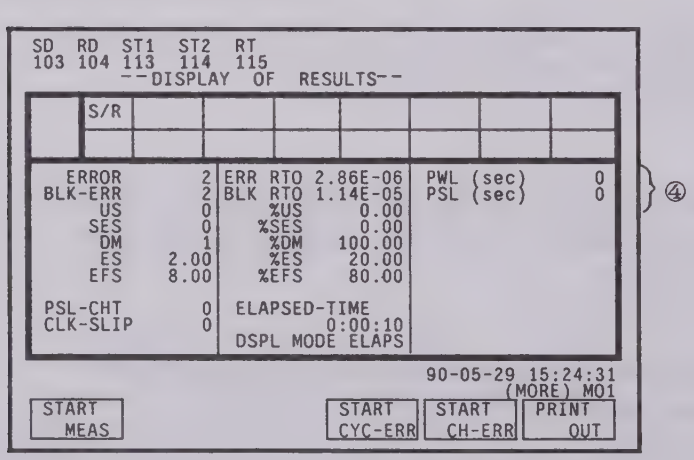


① Types of errors that can be inserted
BIT: Bit error

② Errors that can be detected
BIT: Bit error
PARITY: Parity error (valid for start/stop-sync. parity)

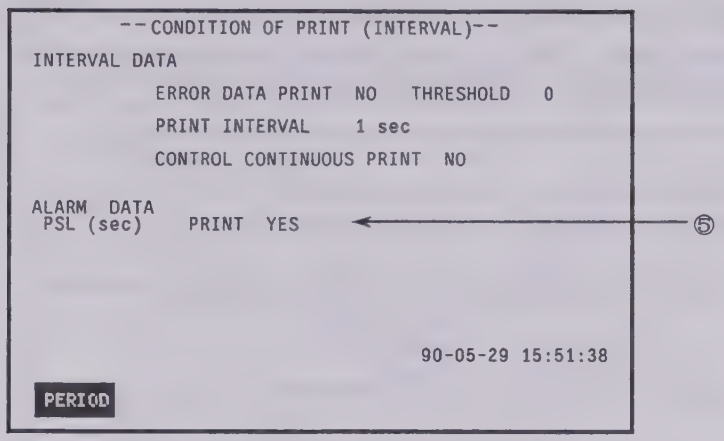
③ Other measurable items
In addition to common items such as ordinary errors, block errors, and error performance, the following items can also be selected for measurement:
PWL (sec): Power-off time
PSL (sec): Pattern sync-loss time

(2) DISPLAY OF RESULTS screen



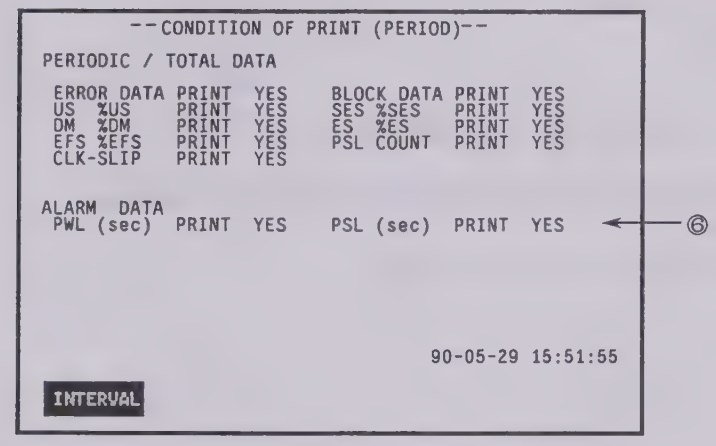
④ Alarm generation time
None except the common items (PWL (sec) and PSL (sec))

(3) CONDITION OF PRINT (INTERVAL) screen



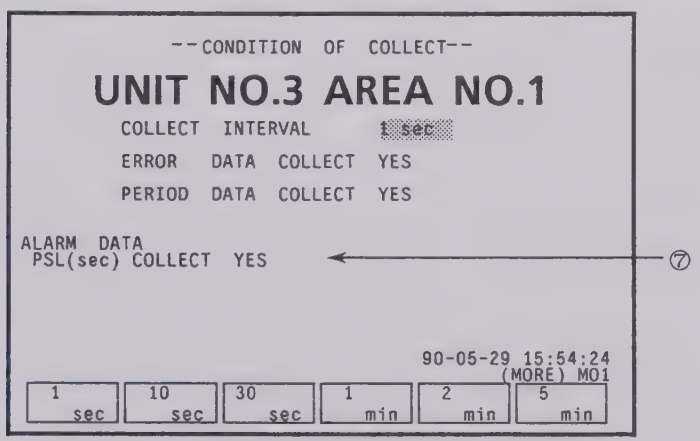
⑤ Interval alarm data
Interval printing for each alarm item can be either enabled or disabled.

(4) CONDITION OF PRINT (PERIOD) screen



⑥ Periodic alarm data
Periodic printing of each alarm can either be enabled or disabled.

(5) CONDITION OF COLLECT screen

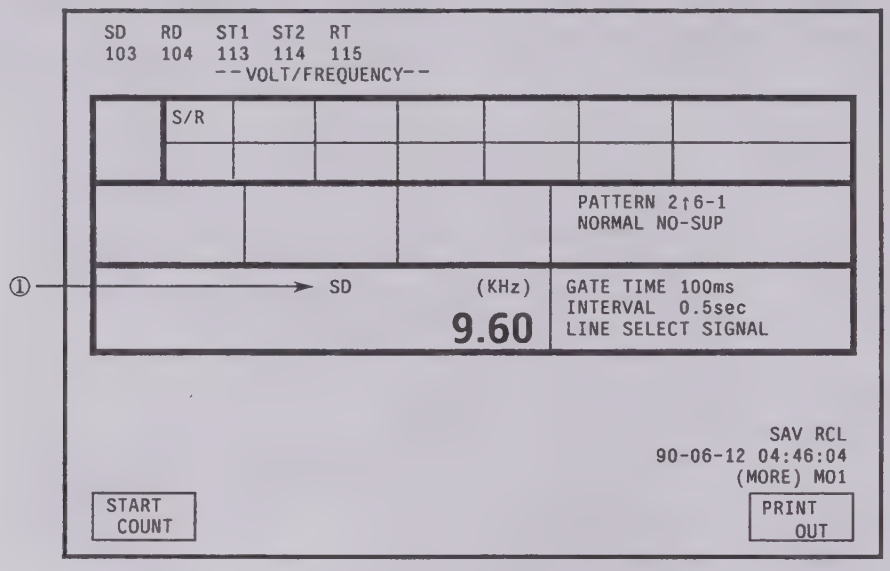


⑦ Interval alarm data collection control
Each interval alarm data item can be selected or deselected for data collection.

2.15.2 Voltage/frequency measurement

The following voltage/frequency measurement items are unique to the MD0626A.

Other items are referred to as common items. For a description of common items and the voltage/frequency measurement items, refer to the MD6420A operation manual.



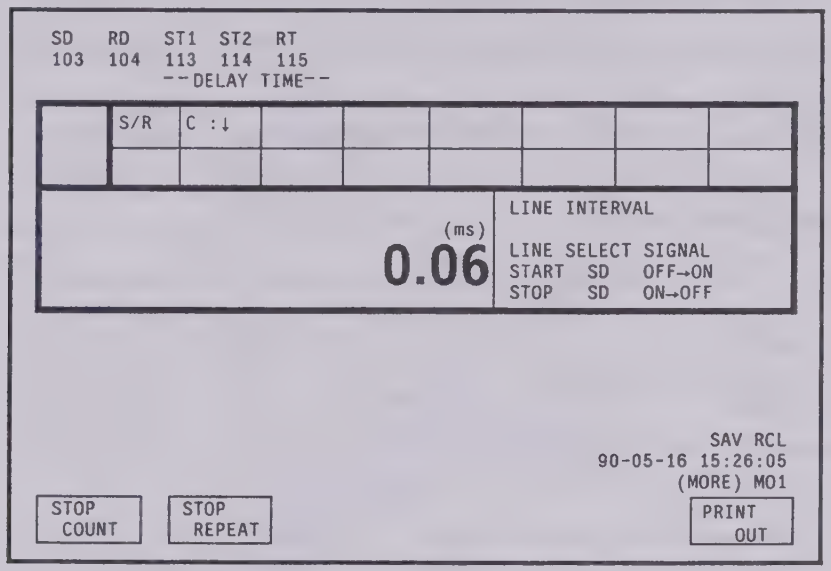
① The frequency of any signal line being monitored by an LED can be selected for measurement.

Note: The voltage can not be measured by the TTL unit.

2.15.3 Line interval measurement

The following line interval measurement items are unique to the MD0626A.

Other items are referred to as common items. For a description of common items and line interval measurement operations, refer to the MD6420A operation manual.

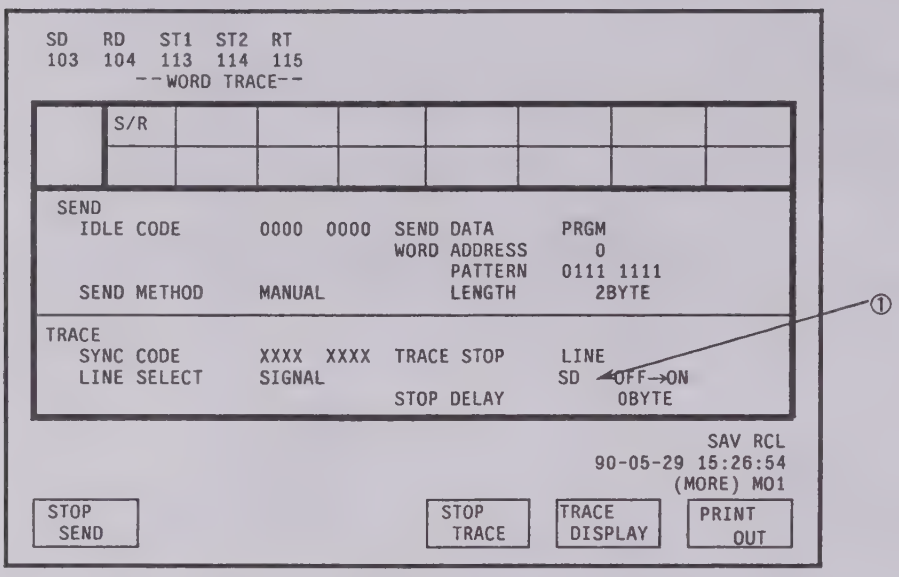


① Any signal line being monitored by an LED can be selected as a START/STOP trigger.

2.15.4 Word trace

The following word-trace items are unique to the MD0626A.

The other items are referred to as common items. For a description of the common items and word-trace operations, refer to the MD6420A operation manual.



① When the trace stop condition (TRACE STOP) is LINE, any signal line being monitored by an LED can be selected as the condition signal line.

2.16 Initial Values for Interface and Measurement Settings

Initial values for interface and measurement settings unique to the MD0626A are shown below.

These values are set when:

1. Initialization is performed from the MODE screen
2. The MD0626A is turned ON after being turned OFF when it was not selected.
3. The measurement screen displayed at the moment the power was turned off is not redisplayed when the power is turned back ON.

(1) Interface settings items

No.	Item		Initial value
①	INTERFACE	Send-interface unit	
②	TIMING	Send-signal generation timing method	ST1
③	CLOCK	Send-signal clock type	INT
④	BIT RATE	Internal-clock frequency (bit rate) of send signal	1200 b/s
⑤	INT FREQ SOURCE	Type of internal-clock slave send signal	SELF
⑥	EXT INTERFACE	Type of external-colck input interface for sending	
⑦	DATA LENGTH	Send-data length	8 BIT
⑧	PARITY	Send-data parity	NON
⑨	STOP BIT	Send-data stop bit	1 BIT
⑩	INTERFACE	Receive-interface unit	
⑪	TIMING	Receive-signal timing method	ST/SP
⑫	BIT RATE	Internal-clock frequency (bit rate) for receive signal	1200 b/s
⑬	DATA LENGTH	Receive data length	8 BIT
⑭	PARITY	Receive-data parity	NON

(2) VOLT/FREQ/COUNT measurement

No.	Item		Initial value
①		Frequency-measurement line name/count-signal name	SD

(3) DELAY measurement

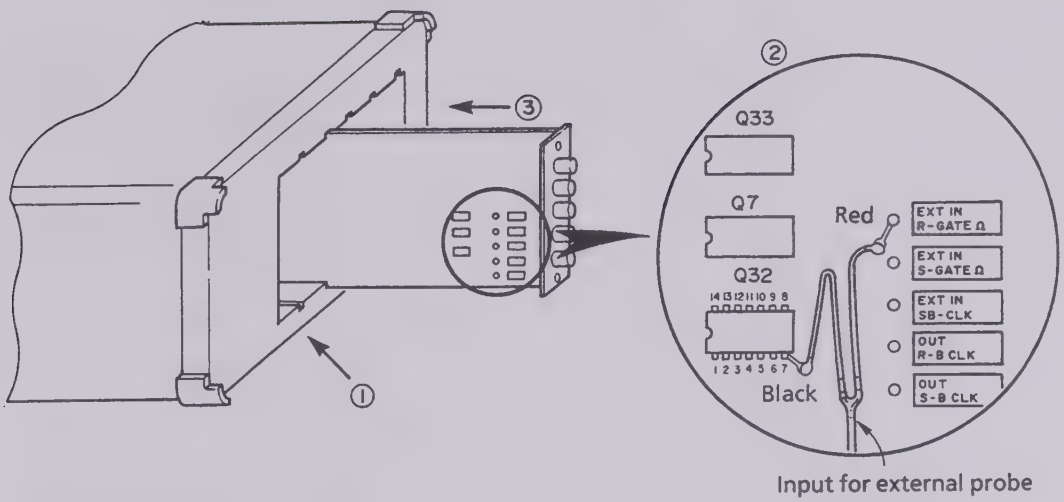
No.	Item		Initial value
①		Measurement-start trigger signal	SD
②		Trigger-signal start measurement condition	OFF → ON
③		Measurement-stop trigger signal	SD
④		Trigger-signal stop measurement condition	OFF → ON

(4) WORD TRACE measurement

No.	Item		Initial value
①		Trace-stop trigger line	SD
②		Trigger stop trace condition	OFF → ON

2.17 Using Internal Check Terminals

The send/receive gating signals, the send byte sync signal input /output signals, and the receive byte sync output signal of the MD0626A can be monitored via the internal check terminals.



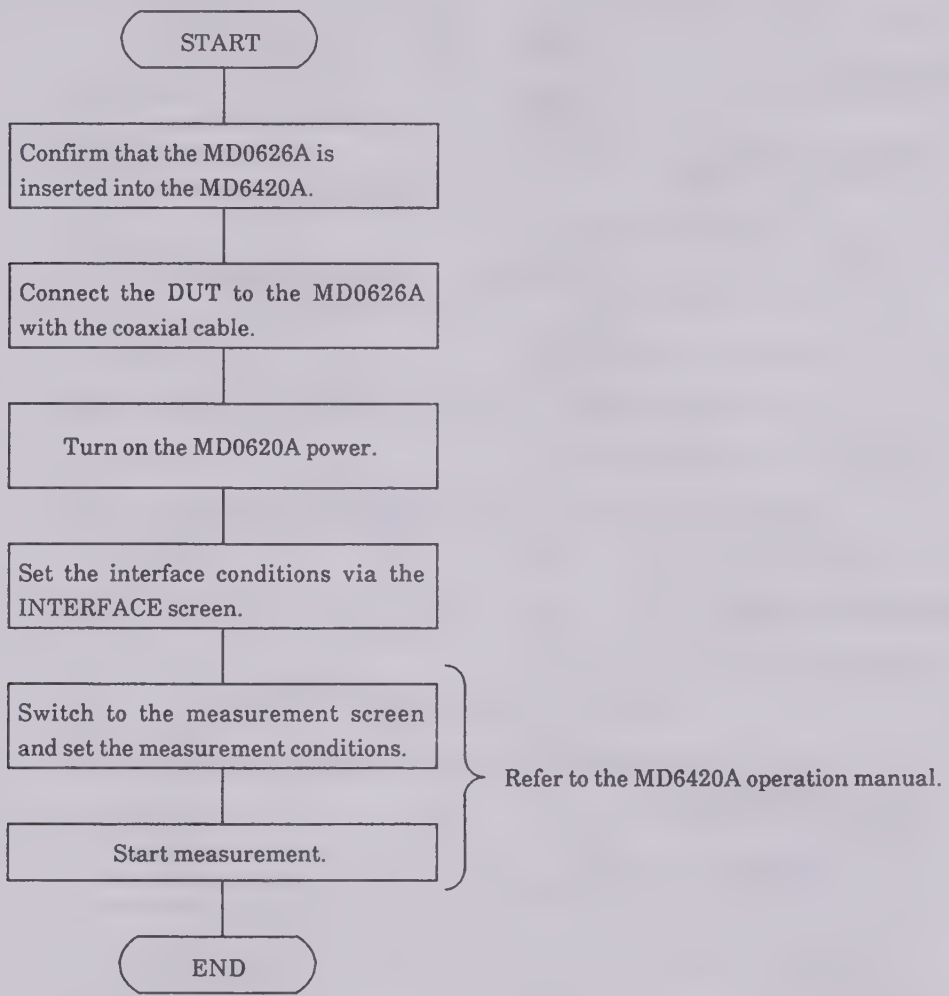
Setup

Step	Procedure
1	Partially insert the MD0626A into any position except the left most slot.
2	Connect the external probe to the internal part to be monitored via the internal check terminals. • Connect the black wire of the probe to the IC ground pin (pin 7 of Q32). • Connect the red wire of the probe to the required internal check terminal.
3	Completely insert the MD0626A firmly into the connector and tighten the top and bottom screws. Run the external input probe wires out from the back of the MD0626A via the left most slot (step 1) in which no unit is inserted.

SECTION 3
APPLICATION

3.1 Introduction

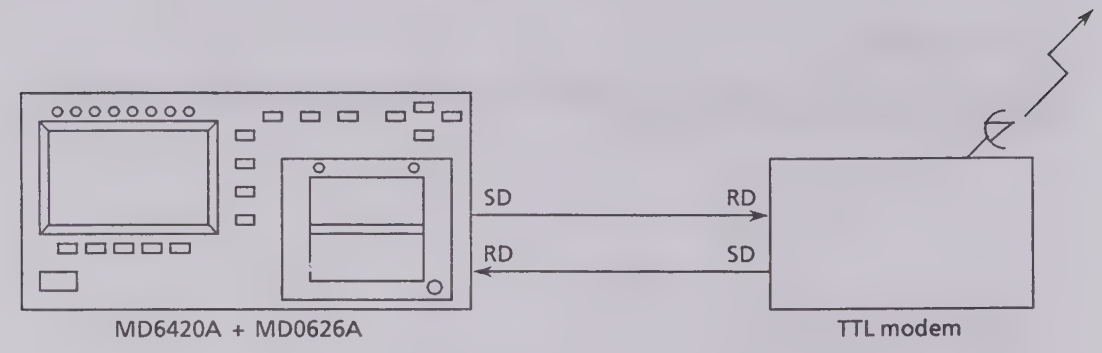
This section describes the measurement procedure for a device under test (DUT). Measurement is roughly divided into the following steps :


START
Confirm that the MD0626A is inserted into the MD6420A.
Connect the DUT to the MD0626A with the coaxial cable.
Turn on the MD0620A power.
Set the interface conditions via the INTERFACE screen.
Switch to the measurement screen and set the measurement conditions.
Start measurement.
Refer to the MD6420A operation manual.
END

The basic setting procedures for the interface screen are described through the following examples :

3.2 Setting Interface Conditions for Measuring with ST/SP Mode

Example:

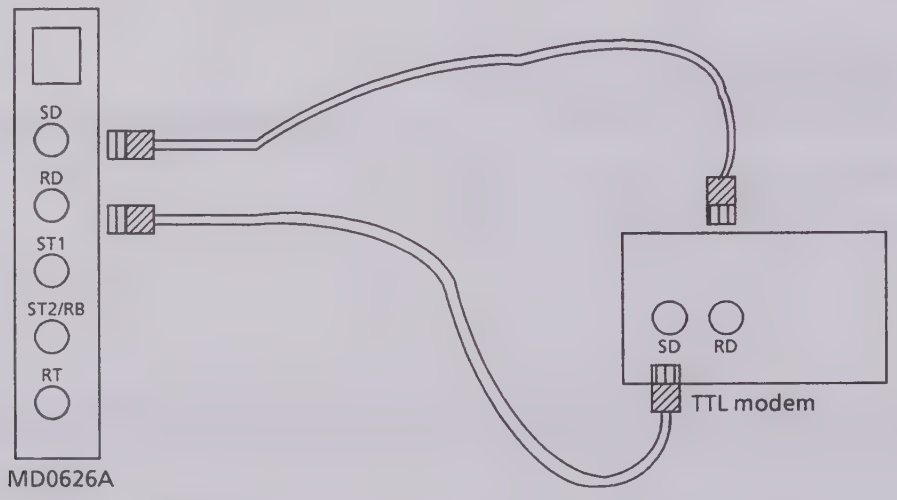


Interface conditions

Sync format	Start/stop mode (ST/SP)
Bit rate	4800 b/s
STOP bit length	2 bit
Data length	8 bit
Parity	None

Only the interface setting procedure is shown in the measurement example.

(1) Coaxial cable connections



Connect SD of the MD0626A to RD of the DUT.

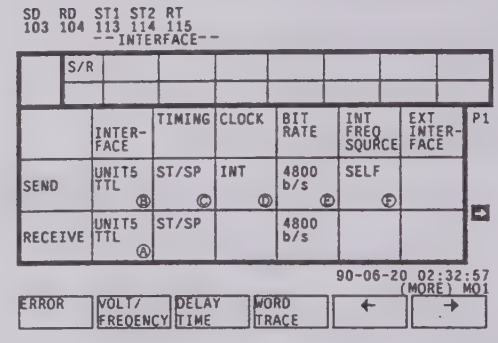
Connect RD of the MD0626A to SD of the DUT.

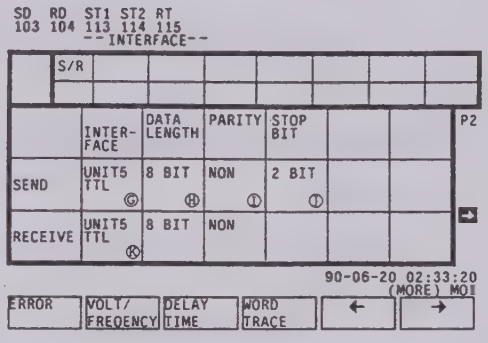
(2) MD6420A Operating Procedure

Step	Procedure	Screen
1.	Set [POWER] to ON.	The MODE screen is displayed.
2.	Press [F2].	The Page one of the INTERFACE screen is displayed.
3.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓐ in the figure below.
4.	Press [TTL].	TTL is displayed at the receive, INTER-FACE (Ⓐ).
5.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓑ.
6.	Press [TTL].	TTL is displayed at SEND, INTERFACE (Ⓑ).
7.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓒ.
8.	Press [F5].	ST/SP is displayed at SEND, TIMING (Ⓒ).
9.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓓ.
10.	Press [F1].	INT is displayed at SEND CLOCK (Ⓓ).
11.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓔ.
12.	Press [F3].	4800 b/s is displayed at SEND, BIT RATE (Ⓔ).
13.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓕ.
14.	Press [F1].	SELF is displayed at SEND INT FREQ SOURCE (Ⓕ).
15.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓐ.
16.	Press [F6] once.	Page two of the INTERFACE screen is displayed.
17.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓖ.
18.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓗ.
19.	Press [F4].	8 BIT is displayed at SEND DATA LENGTH (Ⓗ).
20.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓘ.
21.	Press [F1].	NON is displayed at SEND PARITY (Ⓘ).
22.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓙ.
23.	Press [F3].	2 BIT is displayed at SEND STOP BIT (Ⓙ).
24.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓚ.

Step	Procedure	Screen
25.	Press [MORE] once.	The next page of the function key menu is displayed.
26.	Press [F1].	The send and receive interface conditions are set to the same conditions and TTL is displayed at RECEIVE INTER-FACE (Ⓚ).
27.	Press [CURSOR OFF].	The cursor is erased and the menu changes to the appropriate measurement screen.

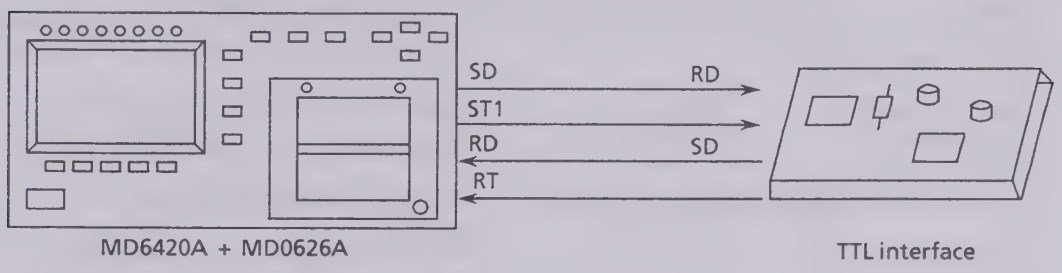
After setting the interface conditions, the display appears as follows





3.3 Setting Interface Conditions for Measuring in the ST1 Mode

Example:

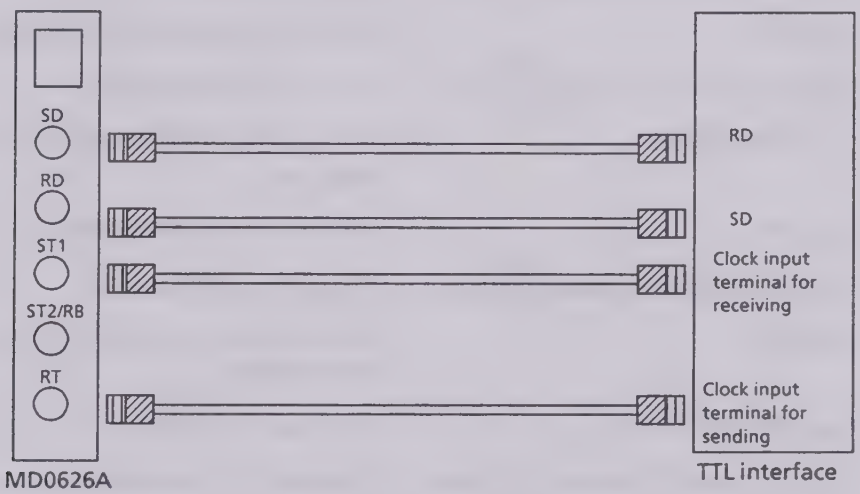


Interface settings

- Sync format ..... Synchronous (ST1)
- Bit rate ..... 64 kb/s

Only the interface setting procedure is described in this measurement example.

(1) Coaxial cable connections

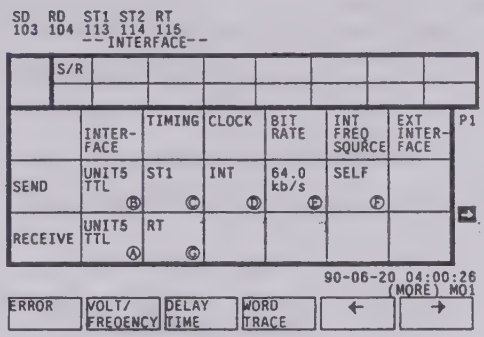


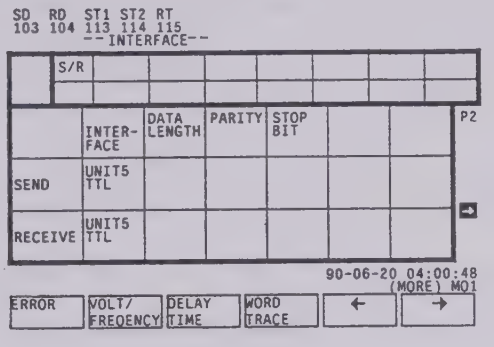
Step	Procedure
1	Connect SD of the TTL unit to RD of the DUT.
2	Connect RD of the TTL unit to SD of the DUT.
3	Connect ST1 of the TTL unit to the receive clock input terminal of the DUT.
4	Connect RD of the TTL unit to the send clock input terminal of the DUT.

(2) MD6420A Operating Procedure

Step	Procedure	Screen
1.	Set [POWER] to ON.	The MODE screen is displayed.
2.	Press [F2].	Page one of the INTERFACE screen is displayed.
3.	Move the cursor by pressing once.	The cursor is displayed at Ⓐ.
4.	Press [TTL] .	TTL is displayed at RECEIVE INTER-FACE (Ⓐ).
5.	Move the cursor by pressing once.	The cursor is displayed at Ⓑ.
6.	Press [TTL] .	TTL is displayed at SEND INTER-FACE (Ⓑ).
7.	Move the cursor by pressing once.	The cursor is displayed at Ⓒ.
8.	Press [F1] .	ST1 is displayed at SEND TIMING (Ⓒ).
9.	Move the cursor by pressing once.	The cursor is displayed at Ⓓ.
10.	Press [F1] .	INT is displayed at SEND CLOCK (Ⓓ).
11.	Move the cursor by pressing once.	The cursor is displayed at Ⓔ.
12.	Press [MORE] once.	The next page of the function key menu is displayed.
13.	Press [F4] once.	64.0 kb/s is displayed at SEND BIT RATE (Ⓔ).
14.	Move the cursor by pressing once.	The cursor is displayed at Ⓕ.
15.	Press [F1].	SELF is displayed at SEND INT FREQ SOURCE (Ⓕ).
16.	Press [CURSOR OFF].	The cursor is turned off.
17.	Move the cursor by pressing once.	The cursor is displayed at Ⓐ.
18.	Move the cursor by pressing once.	The cursor is displayed at Ⓖ.
19.	Press [F1].	RT is displayed at RECEIVE TIMING (Ⓖ).
20.	Press [CURSOR OFF].	The cursor is turned off and the menu changes to the setting screen.

After setting the interface conditions, the display appears as follows :





SECTION 4
SIMPLE OPERATION CHECKS

4.1 Introduction

This section describes how to make simple operation checks and verify that operation is correct when the MD0626A is inserted into the MD6420A.

Simple operation checks consist of :

(1) Insertion state check

(2) Error-measurement by Self Loop check

(3) Frequency-measurement by Self Loop check

4.2 Insertion State Check

After turning the MD6420A power off, insert the MD0626A into the MD6420A real-panel slots and tighten the screws on the top and bottom of the unit.

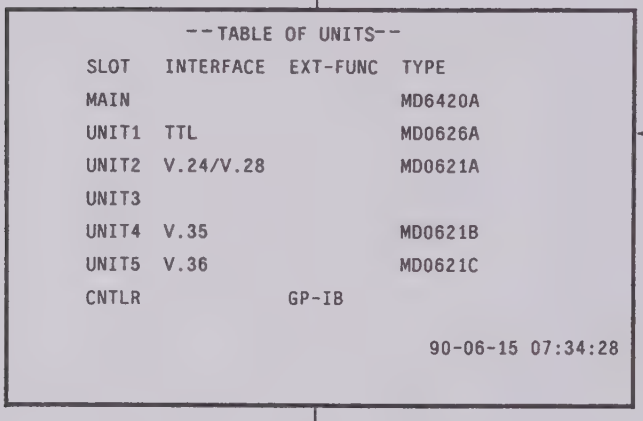
Turn the MD6420A power ON and verify that the MD0626A is inserted properly, as follows:

START

Turn on the MD6420A power.

Display the TABLE OF UNIT screen.

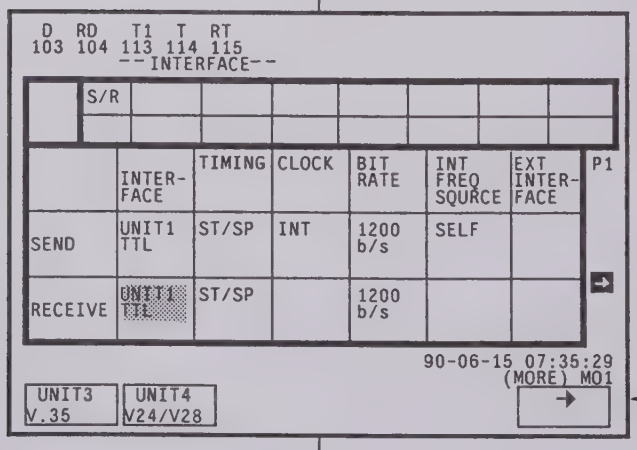
The TABLE OF UNITS menu can be displayed on pages 2 to 4 of the MODE screen provided that the cursor is off. Press [F3] on the TABLE OF UNITS screen.



Verify that TTL is displayed for the unit in whose slot the MD0626A has been inserted.

Display the INTERFACE screen and move the cursor to the RECEIVE INTERFACE field.

Return to the MODE screen by pressing [BACK SCREEN]. Then press [F2] (INTERFACE).
When the INTERFACE screen is displayed, press the CURSOR key to display the cursor at the RECEIVE INTERFACE field.



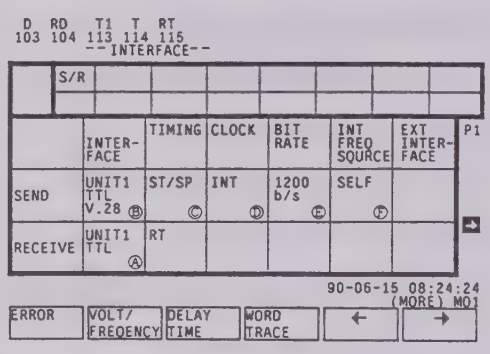
Verify that TTL is displayed for the unit No. in whose slot the MD0626A has been inserted.

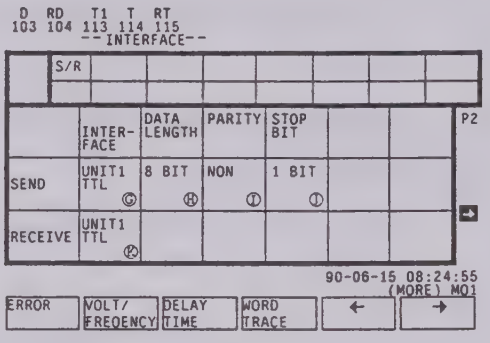
END

4.3 Confirming Error Measurement by SELF LOOP

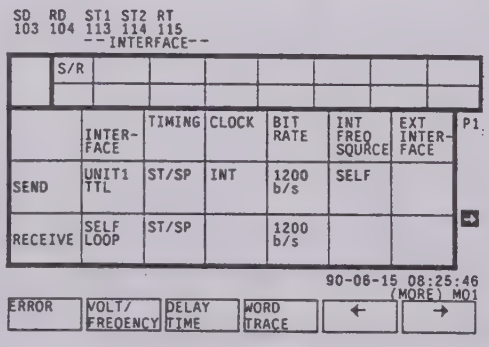
Step	Procedure	Screen
1.	Set [POWER] to ON.	The MODE screen is displayed.
2.	Press [F2].	Page one of the INTERFACE screen is displayed.
3.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓐ as shown in the figure below.
4.	PRESS [TTL].	TTL is displayed at RECEIVE, INTERFACE (Ⓐ).
5.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓑ.
6.	Press [TTL].	TTL is displayed at SEND,INTERFACE (Ⓑ).
7.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓒ.
8.	Press [F5].	ST/SP is displayed at SEND, TIMING (Ⓒ).
9.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓓ.
10.	Press [F1].	INT is displayed at SEND, CLOCK (Ⓓ).
11.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓔ.
12.	Press [F1].	1200 b/s is displayed at SEND, BIT RATE (Ⓔ).
13.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓕ.
14.	Press [F1].	SELF is displayed at SEND INT FREQ SOURCE (Ⓕ).
15.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓐ.
16.	Press [F6] once.	Page two of the INTERFACE screen is displayed.
17.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓖ.
18.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓗ.
19.	Press [F4].	8 BIT is displayed at SEND DATA LENGTH (Ⓗ).
20.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓘ.
21.	Press [F1].	NON is displayed at SEND PARITY (Ⓘ).
22.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓙ.
23.	Press [F3].	2 BIT is displayed at SEND STOP BIT Ⓙ.
24.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓚ.

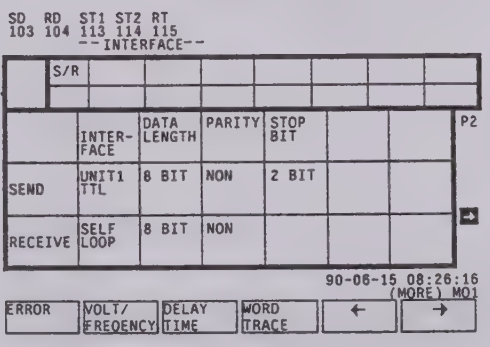
Step	Procedure	Screen
25.	Press [MORE] once.	The next page of the function key menu is displayed.
26.	Press [F2].	The same send and receive interface conditions are set and SELF LOOP is displayed at RECEIVE INTERFACE (Ⓚ).
27.	Press [CURSOR OFF].	The cursor is turned OFF.
28.	Press [F1].	The ERROR measurement screen is displayed.



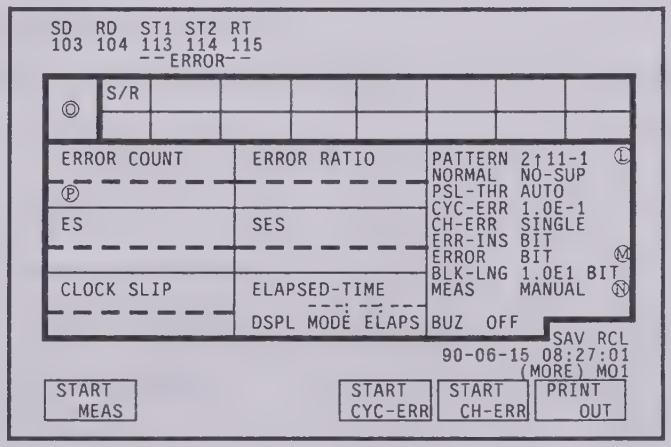


After setting the SELF LOOP mode the display appears as follows:





Step	Procedure	Screen
29.	Move the cursor by pressing [≫] three times.	The cursor is displayed at Ⓛ.
30.	Press [F5].	2 ↑ 15-1 is displayed at PATTERN (Ⓛ).
31.	Move the cursor by pressing [⩛] five times.	The cursor is displayed at Ⓜ.
32.	Press [F1].	BIT is displayed at ERROR (Ⓜ).
33.	Move the cursor by pressing [⩛] twice.	The cursor is displayed at Ⓝ.
34.	Press [F1].	MANUAL is displayed at MEAS (Ⓝ).
35.	Press [CURSOR OFF].	The cursor is turned OFF.
36.	Press [F1].	Measurement starts. Normally, MEAS is displayed at Ⓞ and errors are not counted. (0 is displayed at ERROR COUNT Ⓟ.)
37.	Press [F5] once.	1 is displayed at ERROR COUNT Ⓟ. (The number of errors displayed corresponds to the number of times [F5] is pressed.



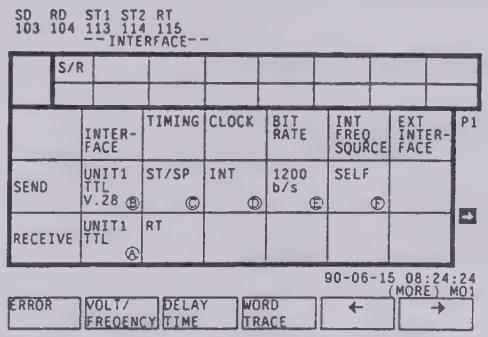
Check method

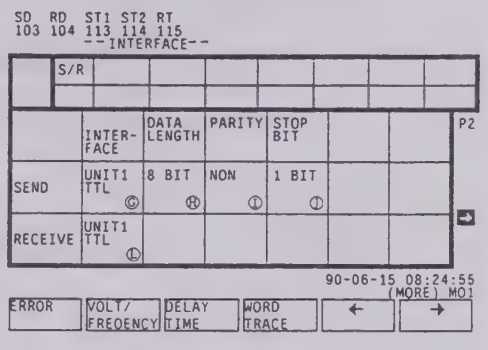
- When measurement starts correctly as described at Step 36 and 0 is displayed at ERROR COUNT, operation is normal.
- When ERROR COUNT corresponds to the number of times [F5] (START CH-ERR) was pressed at Step 37, operation is normal.

4.4 Confirming Frequency Measurement by SELF LOOP

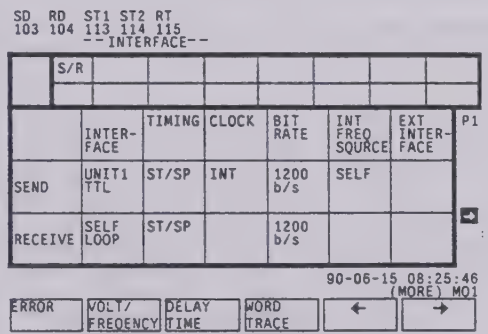
Step	Procedure	Screen
1.	Set [POWER] to ON.	The MODE screen is displayed.
2.	Press [F2].	Page one of the INTERFACE screen is displayed.
3.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓐ in the figure below.
4.	Press [TTL].	TTL is displayed at RECEIVE, INTERFACE (Ⓐ).
5.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓑ.
6.	Press [TTL].	TTL is displayed at SEND, INTERFACE (Ⓑ).
7.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓒ.
8.	Press [F5].	ST/SP is displayed at SEND, TIMING (Ⓒ).
9.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓓ.
10.	Press [F1].	INT is displayed at SEND, CLOCK (Ⓓ).
11.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓔ.
12.	Press [F1].	1200 b/s is displayed at SEND, BIT RATE (Ⓔ).
13.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓕ.
14.	Press [F1].	SELF is displayed at SEND INT FREQ SOURCE (Ⓕ).
15.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓐ.
16.	Press [F6] once.	Page two of the interface screen is displayed.
17.	Move the cursor by pressing [^] once.	The cursor is displayed at Ⓖ.
18.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓗ.
19.	Press [F4].	8 BIT is displayed at SEND DATA LENGTH (Ⓗ).
20.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓘ.
21.	Press [F1].	NON is displayed at SEND PARITY (Ⓘ).
22.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓙ.
23.	Press [F3].	2 BIT is displayed at SEND STOP BIT (Ⓙ).
24.	Move the cursor by pressing [>] once.	The cursor is displayed at Ⓚ.

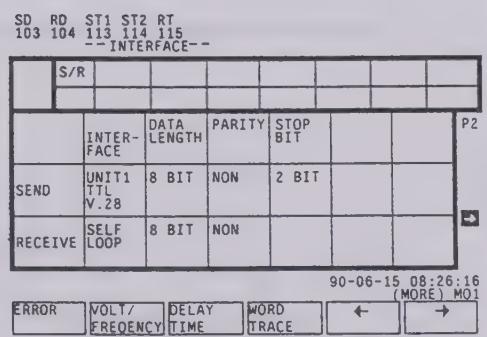
Step	Procedure	Screen
25.	Press [MORE] once.	The next page of the function key menu is displayed.
26.	Press [F2].	The send and receive interface conditions are set to the same conditions and SELF LOOP is displayed at RECEIVE INTERFACE (Ⓚ).
27.	Press [CURSOR OFF].	The cursor is turned off.
28.	Press [F2].	The VOLT/FREQUENCY measurement screen is displayed.



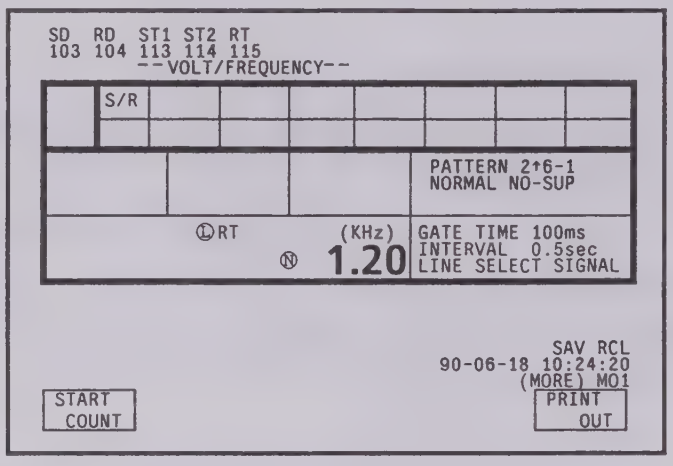


After setting the SELF LOOP mode, the display appears, as follows :





Step	Procedure	Screen
29.	Move the cursor by pressing [≫] three times.	The cursor is displayed at Ⓛ.
30.	Press [F5].	RT is displayed at the frequency measurement signal line (Ⓛ).
31.	Press [CURSOR OFF].	The cursor is turned OFF.
32.	Press [F1].	Frequency measurement is started. Under normal conditions, COUNT flashes at Ⓜ and 1. 20 kHz is displayed at Ⓝ.



Checking for Normal Operation

- At Step 32, when measurement starts correctly, as described in these procedures and 1. 20 kHz is displayed as the measured frequency operation is normal.

  (The measured frequency is equal to the send bit rate.)

SECTION 5
REMOTE CONTROL

5.1 Overview of Remote Control

The MD6420A Data Transmission Analyzer

- MD0620A GP-IB Remote Control Unit
- MD0620B RS-232C Remote Control Unit

can also be used to perform measurements via a remote controller (Anritsu Packet V, IBM-PC, NEC PC-9801(Japan), etc.) when either of the following two Remote Control Units are used.

The MD6420A can be used to remotely control measurements made by the MD0626A.

This section describes items that are unique to a MD0626A being used for remote-control measurements .

For a description of MD6420A common commands, sample programs, etc., refer to the MD6420A operation manual.

The following are described in each paragraph of this section:

5.2 Control Command Table

(1) INTERFACE screen

(2) ERROR screen

(3) VOLT/FREQUENCY screen

(4) DELAY TIME screen

(5) WORD TRACE screen

5.3 Response Data Table

For a detailed description of each command, see Appendix B.

For a detailed description of the response data, see Appendix C.

5.2 Control Command Table

(1) INTERFACE screen-1

Item to be set	Command name	Parameter	Page
Send unit	SUT	0 to 5	B-1
Send-interface unit condition	SUN	0 to 14	B-1
Send-signal generation timing	SMD	0, 3 to 7	B-2
Send-signal clock type	SCK	0, 1	B-2
Frequency of internal send clock	SBR	50 to 8192000	B-3
Internal-clock slave-signal type for sending (Internal Frequency Source)	IFS	0 to 3	B-3
External-clock input interface type for sending (External Interface)	EI	0, 1	B-4
Send-data length	SDL	5 to 8	B-4
Send-data parity	SPR	0 to 2	B-5
Sending-data stop bit	SSP	0 to 2	B-5
No. of receive unit	RUT	0 to 5, 16	B-6
Receive interface unit condition	RUN	0 to 14, 255	B-6
Receive signal timing	RMD	3 to 6	B-7
Frequency of internal receive clock	RBR	50 to 19200	B-7
Receive-data length	RDL	5 to 8	B-8
Receive-data parity	RPR	0 to 2	B-8
Line to be monitored	MSL	0 to 4	B-9

(2) ERROR screen

Setting item	Command name	Parameter	Page
Measured result display selection (top left side)	DSA	0 to 11, 15 to 20	B-10
Measured result display selection (top right side)	DSB	0 to 11, 15 to 20	B-11
Measured result display selection (middle left side)	DSC	0 to 11, 15 to 20	B-12
Measured result display selection (middle right side)	DSD	0 to 11, 15 to 20	B-13
Measured result display selection (bottom left side)	DSE	0 to11, 15 to 20	B-14
Alarm output data format specification	OFA	0, 1	B-15

(3) VOLT/FREQUENCY screen

Setting item	Command name	Parameter	Page
Frequency measurement line	FM	0 to 4, 13	B-16

(4) DELAY TIME screen

Setting item	Command name	Parameter	Page
Start line	SAL	n : 0 to 4, 13 m : 0, 1	B-16
Stop line	SOL	n : 0 to 4, 13 m : 0, 1	B-17

(5) WORD TRACE screen

Setting item	Command name	Parameter	Page
Trace stop line	SL	n : 0 to 4 m : 0, 1	B-18

5.3 Response Data Table

(1) INTERFACE screen

Setting item	Command name	Parameter	Page
Output settings request	DO?	————	C-1

SECTION 6
PRINCIPLE OF OPERATION

6.1 Driver/Receiver

6.1.1 Receiver

Figure 6-1 is the block diagram for the input circuit. The following signal lines can be received.

RD, ST2 /RB, RT

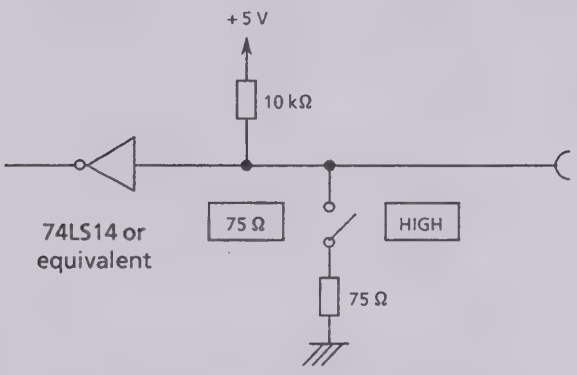


Fig. 6-1 Input-circuit Block Diagram

6.1.2 Driver

Figure 6-3 is the block diagram for the output circuit. The only signal line that can be output is SD or ST1.

SD, ST1

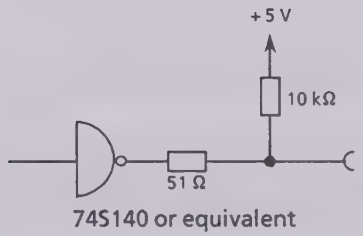


Fig. 6-2 Output-circuit Block Diagram

6.2 Internal Check Terminals

There are five check terminals on the PC board of this unit, which can be used in conjunction with an external probe to monitor TTL input and output signals (See Table 1-2).

① EXT IN R-GATE ... Used when receive signal gating is required. The receive signal is enabled only when the signal input from this terminal is high, as shown below.

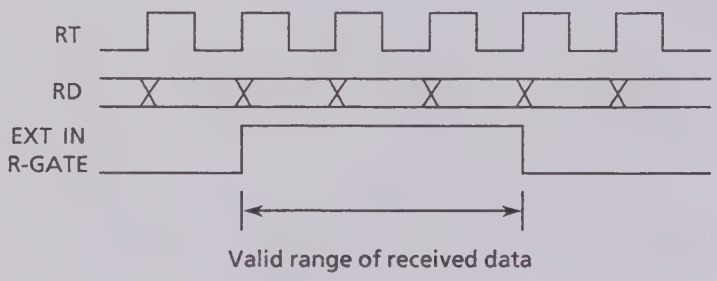


Fig. 6-3 EXT IN R-GATE

② EXT IN S-GATE ... Used when send signal gating is required. The send signal is enabled only when the signal input from this terminal is high, as shown below.

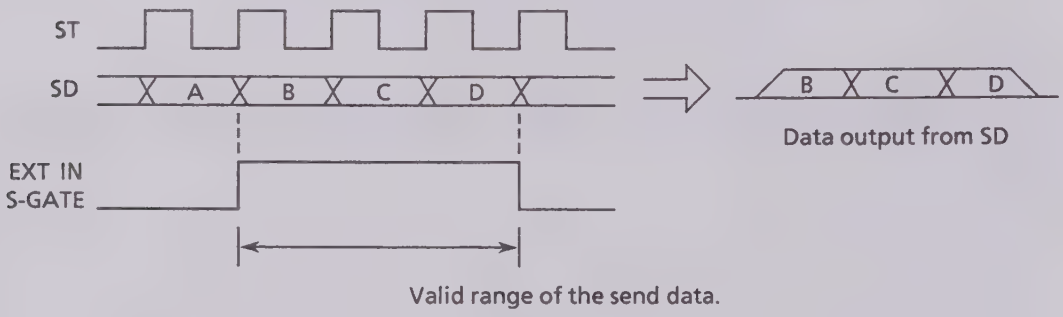


Fig. 6-4 EXT IN S-GATE

③ EXT IN SB-CLK ... This is a terminal into which the byte sync send signal is input. When send timing is ST/SP, this signal is disabled as shown below.

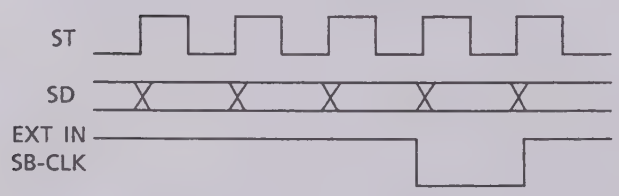


Fig. 6-5 EXT IN SB-CLK

④ OUT R-B CLK ... The RB CLK signal is output via the RB terminal

⑤ OUT S-B CLK ... Outputs the byte sync send signal (The sync send signal is the signal input from the EXT IN SB-CLK terminal or the byte sync send signal when the ST/SP mode is enabled.)

The input circuit for ①, ② and ③ is shown below.

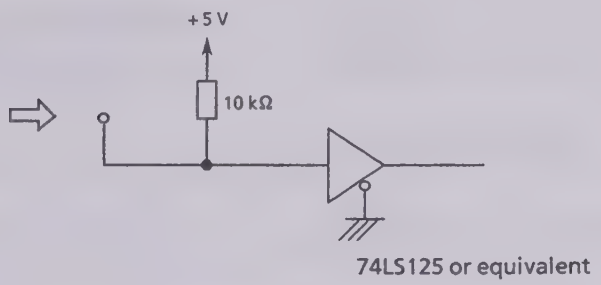


Fig. 6-6 Input Circuit Diagram

The output circuit for ④ and ⑤ is shown below.

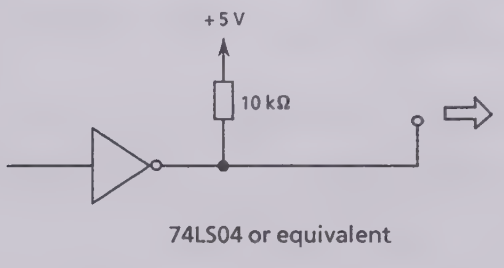


Fig. 6-7 Output Circuit Diagram

6.3 Switching the input signal of ST2/RB terminal

Either the ST2 (send external clock) or RB (receive byte sync signal).
Signal can be selected for input to the ST2/RB terminal via the S3 dip switch.

ST2····· Set when the signal which is input from the ST2/RB terminal is ST2.

RD····· Set when the signal which is input from the ST2/RB terminal is the receive byte sync signal. However, this can be used only when the receive timing signal is ST1.

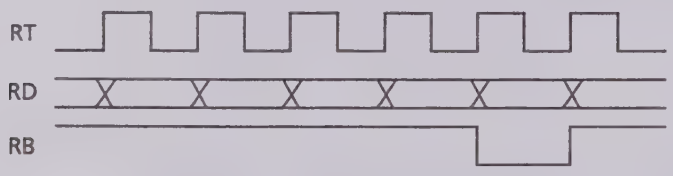


Fig. 6-8 RT, RD and RB Signals

6.4 Connecting Circuits

The names and significance of the signal lines connected to the MD0626A are described below. These circuits conform to V.24 specifications.

① SD (CCITT Circuit No.103-Transmitted data)

Direction : To DCE

The data signals originated by the DTE:

(1) to be transmitted via a data channel to one or more remote data stations,

(2) to be passed to the DCE for maintenance test purposes under control of the DTE, or

(3) for the programming or control of serial automatic calling DCEs,

are transferred on this circuit to the DCE.

② RD (CCITT Circuit No.104-Received data)

Direction: From DCE

The data signals generated by the DCE:

(1) in response to data channel line signals received from a remote data station,

(2) in response to the DTE maintenance test signals, or

(3) in response to (or as an echo of) programming or control signals from the DTE where a serial automatic calling facility is implemented in the DCE,
are transferred on this circuit to the DTE.

③ ST1 (CCITT Circuit No. 113-Transmitter signal element timing (DTE source))

Direction : To DCE

Signals on this circuit provide the DCE with signal element timing information.

The condition on this circuit shall be ON and OFF for nominally equal periods of time and the transition from ON to OFF condition shall nominally indicate the center of each signal element on circuit 103.

④ ST2 (CCITT Circuit No. 114-Transmitter signal element timing (DCE source))

Direction : From DCE

Signals on this circuit provide the DTE with signal element timing information.

The condition on this circuit shall be ON and OFF for nominally equal period of time. The DTE shall present a data signal on circuit 103 in which the transitions between signal elements nominally occur at the time of the transitions from OFF to ON condition of circuit 114.

⑤ RT (CCITT Circuit No. 115-Receive signal element timing (DCE source))

Direction : From DCE

Signals on this circuit provide the DTE with signal element timing information.

The condition of this circuit shall be ON and OFF for nominally equal periods of time, and a transition from ON to OFF condition shall nominally indicate the center of each signal element on circuit 104.

6.5 Send Timing

6.5.1 ST1 mode

When the ST1 synchronous mode is set, the MD6420A becomes the master clock source.

The relationship between ST1 and T is shown in the block diagram (Fig.6-9) and the phase relationship is shown in Fig. 6-10

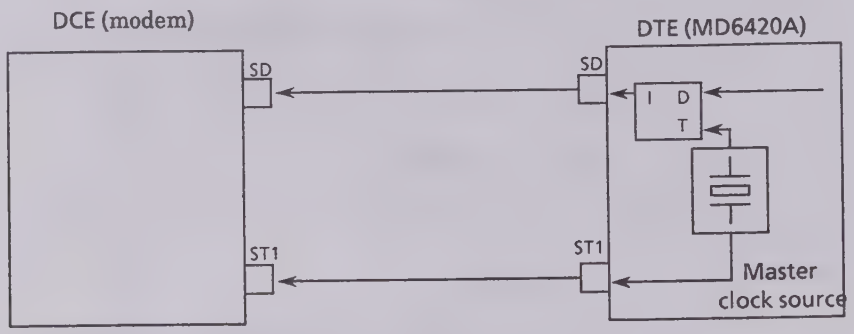


Fig. 6-9 Block Diagram

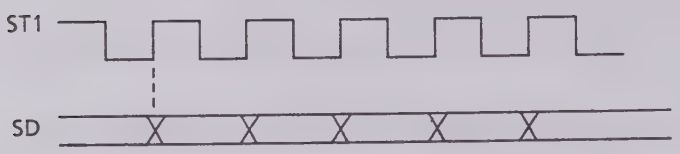


Fig. 6-10 Phase Relationship

6.5.2 ST2 mode

When the ST2 synchronous mode is set, the ST2 clock supplied by the DCE is used as the send timing signal.

The relationship between ST2 and T is shown in the block diagram (Fig. 6-11) and the phase relationship is shown in Fig. 6-12.

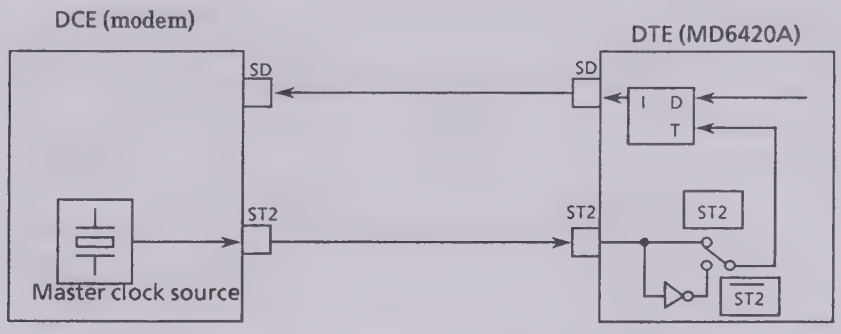


Fig. 6-11 Block Diagram

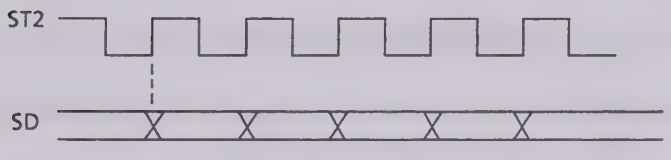


Fig. 6-12 Phase Relationship

6.5.3 $\overline{ST2}$ mode

When the ST2 mode is set, the inverted ST2 clock is used as the send timing signal.

The relationship between $\overline{ST2}$ and T is shown in the block diagram (Fig. 6-11) and the phase relationship is shown in Fig. 6-13.

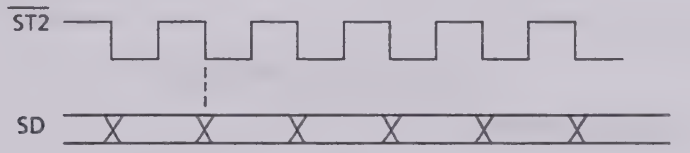


Fig. 6-13 Phase Relationship

6.5.4 ASYNC mode

When the asynchronous mode is set, the MD6420A internal clock is used for both send and receive timing.

The relationships among SD, RD and the master clock source are as shown in the block diagram (Fig. 6-14).

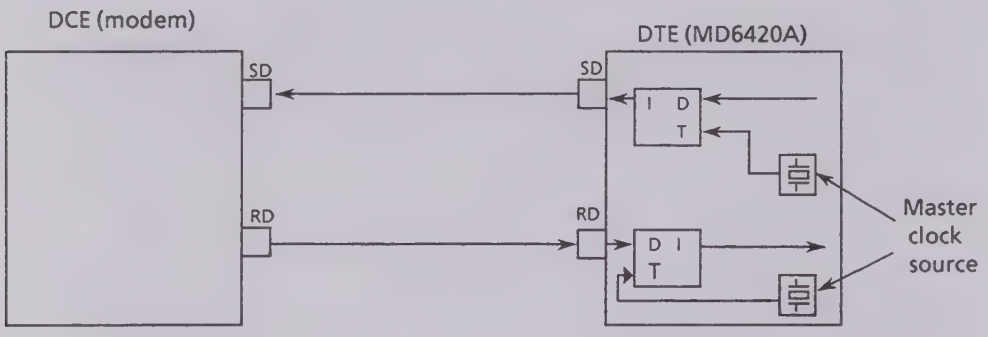


Fig. 6-14 Block Diagram

6.5.5 ST/SP mode

When the start/stop mode is set,the MD6420A internal clock is used as both the send and receive clocks.

The relationships among SD, RD and the master clock source are as shown in the block diagram (Fig. 6-15).

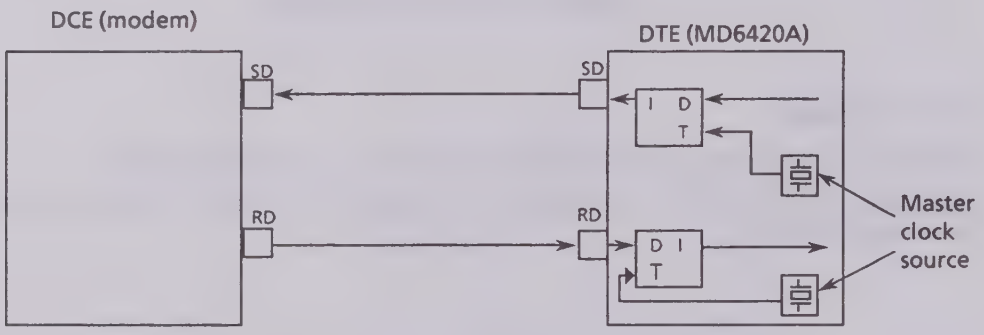


Fig. 6-15 Block Diagram

Details are explained in Paragraph 6.7

6.5.6 RT mode

When the RT synchronous mode is set, the RT (receive timing) clock supplied by the DCE is used as the send timing signal. The relationship between RT and SD is shown in the block diagram (Fig. 6-16) and the phase relationship is shown in Fig. 6-17

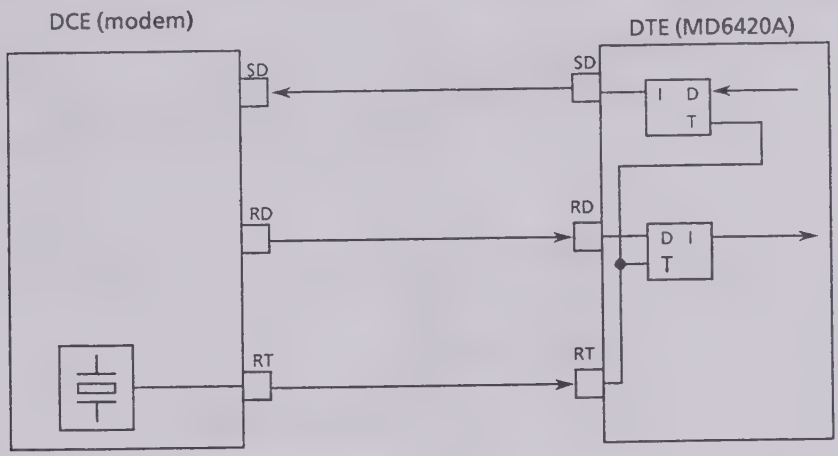


Fig. 6-16 Block Diagram

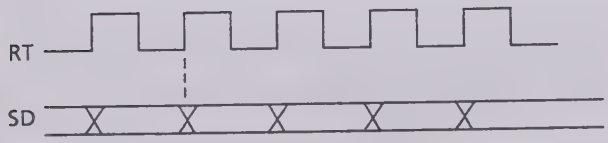


Fig. 6-17 Phase Relationship

6.6 Receive Timing

6.6.1 RT mode

When the RT synchronous mode is used, the RT clock supplied by the DCE is used as the receive timing signal.

The relationship between RT and RD is shown in the block diagram (Fig. 6-18). Figure 6-19 shows the timing relationship.

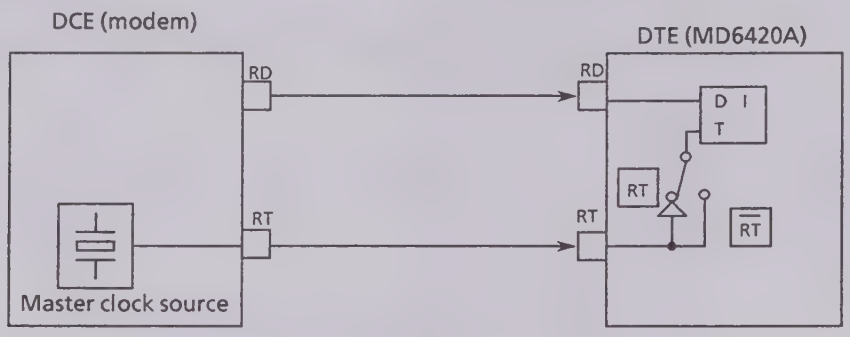
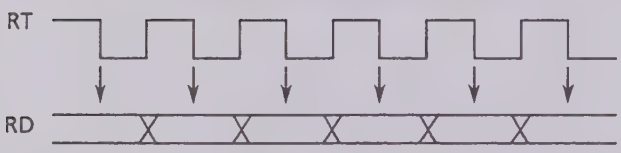


Fig. 6-18 Block Diagram



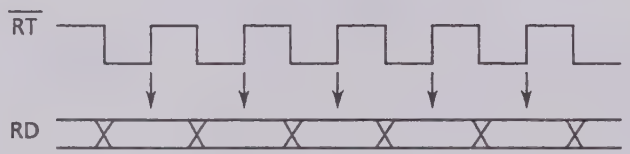
(RD is sampled at the time intervals indicated by the ↓ mark.)

Fig. 6-19 Phase Relationship

6.6.2 $\overline{RT}$ mode

In the $\overline{RT}$ mode, the inverted RT (RT) clock is used as the receive timing signal.

The relationship between $\overline{RT}$ and RD is shown in the block diagram (Fig. 6-18). Figure 6-20 shows the timing relationship.



(RD is sampled at the time intervals indicated by the ↓ mark.)

Fig. 6-20 Phase Relationship

6.6.3 ST mode

In the ST mode, the MD6420A internal clock is used as both the receive and send timing clock signal.

The relationships among ST1, SD and RD are shown in the block diagram of Fig. 6-21. The block diagram of Fig. 6-22 shows the relationship among ST2, SD and RD. Fig. 6-23 shows the timing relationship between ST and RD.

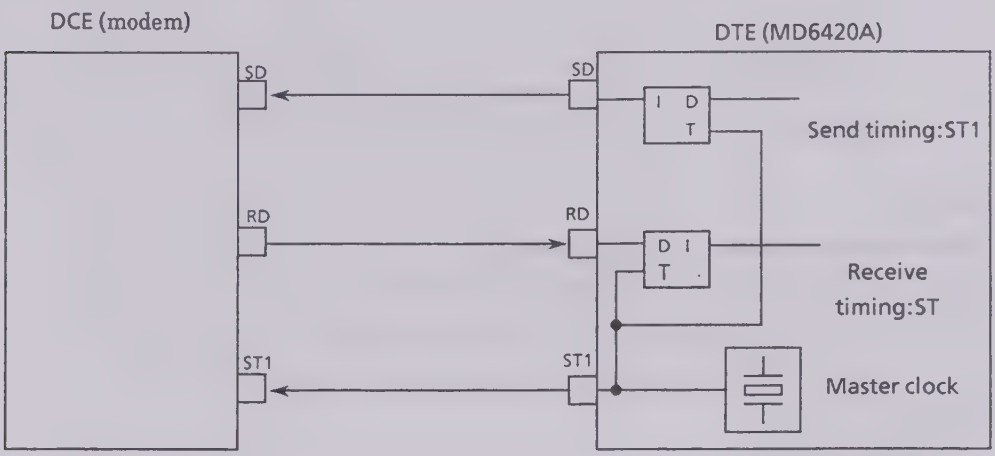


Fig. 6-21 Block Diagram

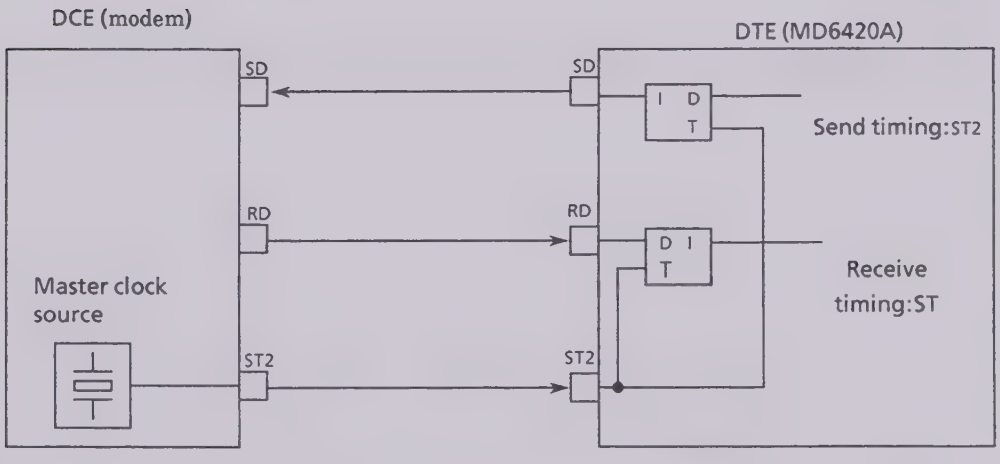
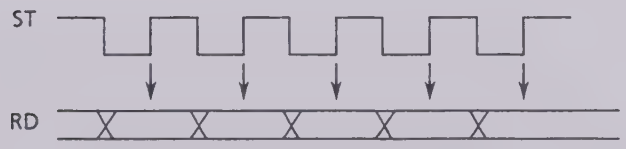


Fig. 6-22 Block Diagram



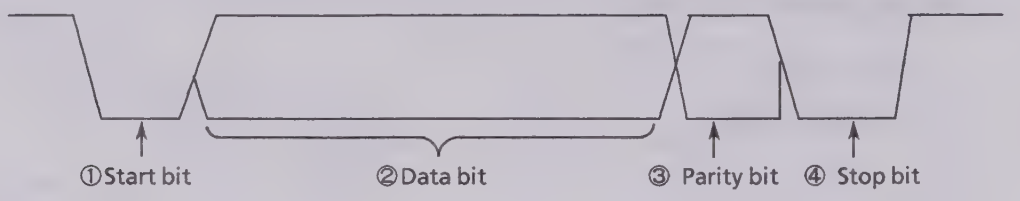
(RD is sampled at the time intervals indicated by the ↓ mark)

Fig. 6-23 Phase Relationship

6.7 Start/Stop Synchronization

In the synchronous start/stop mode, synchronization is established by inserting data between the start and stop bits.

The figure below shows the format of the bit pattern.



① Start bit

A 0 bit signifies the start of the data transmission.

② A bit length of 5 to 8 bits can be set as the length of the data code.

The following data bit lengths are used in the following codes.

5 bits ··· Baudot code

6 bits ··· EBCD code

7 bits··· ASCII code

8 bits··· EBCDIC code

③ Parity bit

Even, odd or no parity can be used when performing error detection.

④ Stop bit

This bit is appended at the end of data. The number of bits to be appended can be selected from 1 bit, 1.5 bits and 2 bits.

6.8 Self-Loop Mode

In this mode, the send pattern of the MD0626A (TTL Interface unit) is looped back and input as the receive pattern to the MD0626A.

This can be used to test error measurement capabilities. An absence of errors confirms that the MD6420A main frame and this unit are functioning property.

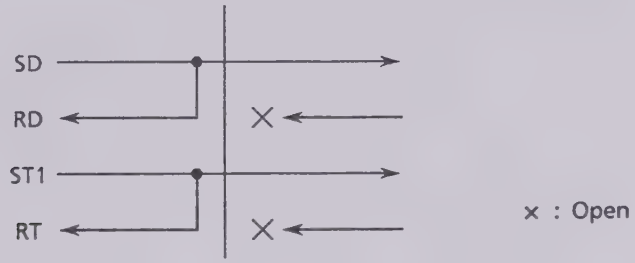
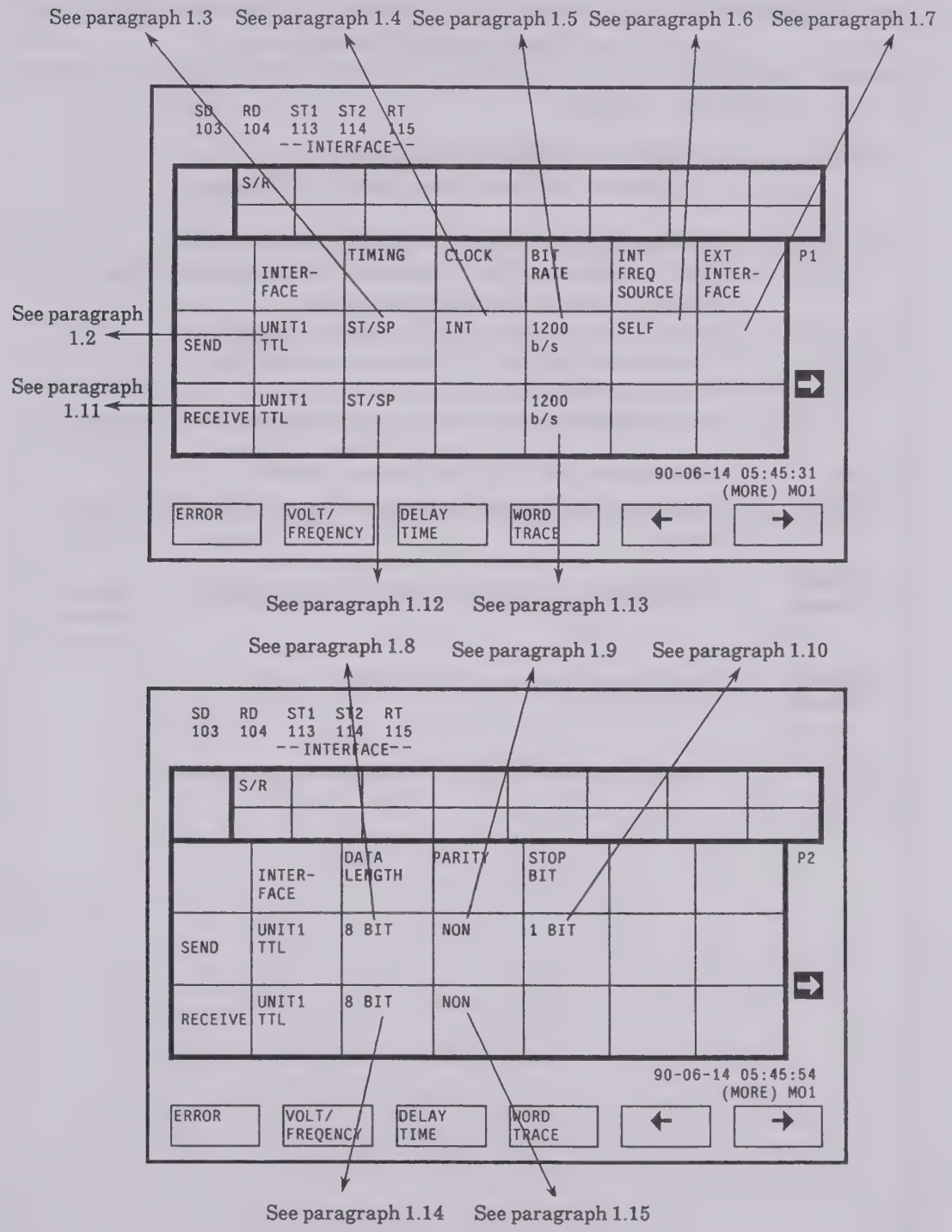


Fig. 6-25 Connections in Self-Loop Mode

APPENDIX A

MENU CONTROL

- If no cursor is displayed ⟶ See paragraph 1.1

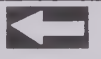
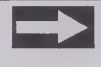


Note: As the send and receive interface units change, the allowable range of cursor movements also changes.

1.1 Menu for Function Selection

Cursor position	Cursor not displayed	Label	None
Outline	Select functions from menu on INTERFACE screen.		

Function key labels and explanations:

ERROR	° When pressed, the ERROR screen is fetched. Error measurement is performed via the ERROR screen.
VOLT/ FREQENCY	° When pressed, the VOLT/FREQUENCY screen is fetched. The voltage and frequency of each signal line on the receive side are measured via the VOLT/FREQUENCY screen.
DELAY TIME	° When pressed, the DELAY TIME screen is fetched. The time difference between transitions in the levels of 2 signal lines or the transmission delay time can be measured via the DELAY TIME screen.
WORD TRACE	° When pressed, the WORD TRACE screen is fetched. The send pattern is set and receive data are traced via the WORD TRACE screen.
	° When pressed, the screen scrolls to the left (previous page).
	° When pressed, the screen scrolls to the right (next page).
PRINT OUT	° When pressed, the INTERFACE screen settings are printed.

1.2 Menu for Send Interface Unit Setting

Cursor position	Sets send interface unit conditions	Label	INTER-FACE (SEND)
Outline	Sets the send interface unit conditions.		

Function key labels and explanations:

UNIT 1 XXXXXXXX	° When pressed, the send interface unit is set to the interface unit inserted in slot 1.
UNIT 2 XXXXXXXX	° When pressed, the send interface unit is set to the interface unit inserted in slot 2.
UNIT 3 XXXXXXXX	° When pressed, the send interface unit is set to the interface unit inserted in slot 3.
UNIT 4 XXXXXXXX	° When pressed, the send interface unit is set to the interface unit inserted in slot 4.
UNIT 5 XXXXXXXX	° When pressed, the send interface unit is set to the interface unit inserted in slot 5.
	° When pressed, the screen scrolls to the right (next page).

1.3 Menu for Setting the Method by which the Send Signal is Generated

Cursor position	Sets send signal generation timing	Label	TIMING (SEND)
Outline	Sets the send signal generation timing.		

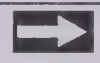
Function key labels and explanations:

ASYNC	° When pressed, the send signal is generated asynchronously.
ST/SP	° When pressed, the send signal is generated in accordance with ST/SP (start/stop).
ST1	° When pressed, the send signal is generated in accordance with the internal clock.
RT	° When pressed, the send signal is generated in accordance with the RT signal.
ST2	° When pressed, the send signal is generated in accordance with the ST2 signal.
ST2 (INV)	° When pressed, the send signal is generated in accordance with the inverted ST2 (INV) signal.
	° When pressed, the screen scrolls to the right (next page).

1.4 Menu for Send Signal Clock Setting

Cursor position	Sets send signal clock	Label	CLOCK (SEND)
Outline	Sets the clock to generate the send signal.		

Function key labels and explanations:

INT	° When pressed, the send signal clock is set to the internal clock.
EXT	° When pressed, the send signal clock is set to the external clock. (Clock input from EXT1 connector)
	° When pressed, the screen scrolls to the right (next page).

1.5 Menu for Setting the Send Frequency of the Internal Clock

Cursor position	Sets sending internal clock frequency	Label	BIT RATE (SEND)
Outline	Sets the sending frequency of the internal clock.		

Function key labels and explanations:

1200 b/s	° When pressed, the sending internal clock frequency is set to 1200 b/s.
2400 b/s	° When pressed, the sending internal clock frequency is set to 2400 b/s.
4800 b/s	° When pressed, the sending internal clock frequency is set to 4800 b/s.
9600 b/s	° When pressed, the sending internal clock frequency is set to 9600 b/s.
14400 b/s	° When pressed, the sending internal clock frequency is set to 14400 b/s.
19200 b/s	° When pressed, the sending internal clock frequency is set to 19200 b/s.
48 kb/s	° When pressed, the sending internal clock frequency is set to 48 kb/s.
56 kb/s	° When pressed, the sending internal clock frequency is set to 56 kb/s.
64k b/s	° When pressed, the sending internal clock frequency is set to 64 kb/s.
128 kb/s	° When pressed, the sending internal clock frequency is set to 128 kb/s.
144 kb/s	° When pressed, the sending internal clock frequency is set to 144 kb/s.
256k b/s	° When pressed, the sending internal clock frequency is set to 256 kb/s.
384k b/s	° When pressed, the sending internal clock frequency is set to 384 kb/s.
512k b/s	° When pressed, the sending internal clock frequency is set to 512 kb/s.
1536k b/s	° When pressed, the sending internal clock frequency is set to 1536 kb/s.
	° When pressed, the screen scrolls to the right (next page).

Note: The send frequency of the internal clock can be set from 50 b/s to 8192 kb/s with the [MODIFY] keys.

1.6 Menu for Setting the Send Slave Signal of the Internal Clock

Cursor position	Sets the send internal-clock slave signal	Label	INT FREQ SOURCE (SEND)
Outline	Sets the signal to which the send signal is synchronized.		

Function key labels and explanations:

SELF	° When pressed, the send signal is slave synchronized to the internal self oscillating clock.
EXT1 8k	° When pressed, the send signal is slave synchronized to the 8k clock (8k clock input from EXT1 connector).
EXT2 64 k + 8 k	° When pressed, the send signal is slave synchronized to the 64k + 8k clock (64k + 8k clock input from EXT1 connector).
RD 8k	° When pressed, the send signal is slave synchronized to the receive signal.
→	° When pressed, the screen scrolls to the right (next page).

1.7 Menu for Setting the Input Interface for the Send External-Clock

Cursor position	Sets send external-clock input interface	Label	EXT INTERFACE (SEND)
Outline	Sets the signal convention for the input interface so that external clock with which the send signal is synchronized can be input from the EXT1 connector.		

Function key labels and explanations:

TTL	° When pressed, the signal convention for the external-clock of the input interface is set to TTL.
75 Ω	° When pressed, the sine wave (75Ω) signal convention is used for the external-clock of the input interface.
→	° When pressed, the screen scrolls to the right (next page).

1.8 Menu for Setting the Length of the Send Data

Cursor position	Sets send data length	Label	DATA LENGTH (SEND)
Outline	Sets the send data length.		

Function key labels and explanations:

5 BIT	° When pressed, the send data length is set to 5 bits.
6 BIT	° When pressed, the send data length is set to 6 bits.
7 BIT	° When pressed, the send data length is set to 7 bits.
8 BIT	° When pressed, the send data length is set to 8 bits.
	° When pressed, the screen scrolls to the right (next page).

1.9 Menu for Setting the Send-Data parity

Cursor position	Sets send-data parity	Label	PARITY (SEND)
Outline	Sets the send-data parity		

Function key labels and explanations:

NON	° When pressed, no parity bit is appended to the send data.
ODD	° When pressed, an ODD parity bit is appended to the send data.
EVEN	° When pressed, an even parity bit is appended to the send data.
	° When pressed, the screen scrolls to the right (next page).

1.10 Menu for Setting the Number of Stop-Bits for the Send-Data

Cursor position	Sets send-data stop-bit type	Label	STOP BIT (SEND)
Outline	Sets the number of send-data stop-bits.		

Function key labels and explanations:

1 BIT	° When pressed, only 1 send-data stop-bit is used.
1.5 BIT	° When pressed, 1.5 send-data stop-bits are used.
2 BIT	° When pressed, 2 send-data stop-bits are used.
	° When pressed, the screen scrolls to the right (next page).

1.11 Menu for Setting the Receive Interface Unit

Cursor position	Sets the receive interface unit	Label	INTER-FACE (RECEIVE)
Outline	Sets the receive interface unit.		

Function key labels and explanations:

UNIT 1 XXXXXXXX	° When pressed, the receive interface unit is set to the interface unit inserted in slot 1.
UNIT 2 XXXXXXXX	° When pressed, the receive interface unit is set to the interface unit inserted in slot 2.
UNIT 3 XXXXXXXX	° When pressed, the receive interface unit is set to the interface unit inserted in slot 3.
UNIT 4 XXXXXXXX	° When pressed, the receive interface unit is set to the interface unit inserted in slot 4.
UNIT 5 XXXXXXXX	° When pressed, the receive interface unit is set to the interface unit inserted in slot 5.
SAME	° When pressed, the receive interface unit condition is set to the same condition as the send interface condition.
SELF LOOP	° When pressed, the receive interface unit condition is set to SELF LOOP.
	° The screen scrolls to the right (next page).

1.12 Menu for Setting the Method by which the Receive-Signal is Generated

Cursor position	Sets receive-signal generation timing	Label	TIMING (RECEIVE)
Outline	Sets the receive-signal generation timing method.		

Function key labels and explanations:

ASYNC	° When pressed, the receive signal is generated asynchronously.
ST/SP	° When pressed, the receive-signal is generated in accordance with ST/SP (Start/stop).
RT	° When pressed, the receive-signal generation timing is generated in accordance with the RT signal.
RT (INV)	° When pressed, the receive-signal generation timing is generated in accordance with the inverted RT (INV) signal .
	° When pressed, the screen scrolls to the right (next page).

1.13 Menu for Setting the Clock Frequency of the Receive Signal

Cursor position	Sets internal clock frequency of receive signal	Label	BIT RATE (RECEIVE)
Outline	Sets the internal clock frequency of the receive signal.		

Function key labels and explanations:

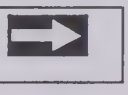
1200 b/s	° When pressed, the internal clock frequency for the receive signal is set to 1200 b/s.
2400 b/s	° When pressed, the internal clock frequency for the receive signal is set to 2400 b/s.
4800 b/s	° When pressed, the internal clock frequency for the receive signal is set to 4800 b/s.
9600 b/s	° When pressed, the internal clock frequency for the receive signal is set to 9600 b/s.
14400 b/s	° When pressed, the internal clock frequency for the receive signal is set to 14400 b/s.
19200 b/s	° When pressed, the internal clock frequency for the receive signal is set to 19200 b/s.
	° When pressed, the screen scrolls to the right (next page).

Note: The clock frequency for the receive signal can be set from 50 b/s to 19200 b/s with the [MODIFY] keys.

1.14 Menu for Setting the Receive Data Length

Cursor position	Sets receive data length	Label	DATA LENGTH (RECEIVE)
Outline	Sets the receive data length.		

Function key labels and explanations:

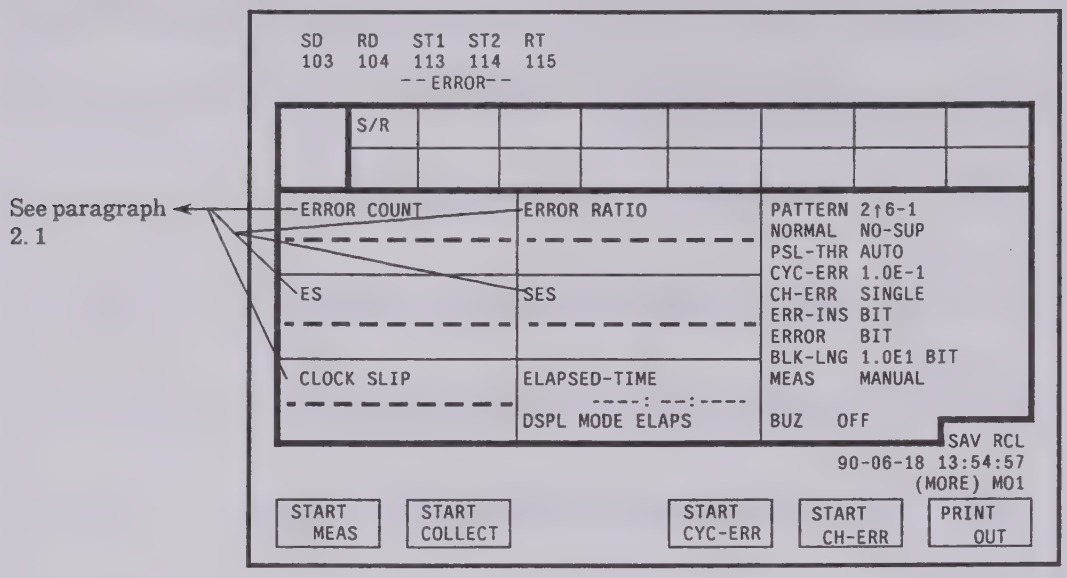
5 BIT	° When pressed, the receive data length is set to 5 bits.
6 BIT	° When pressed, the receive data length is set to 6 bits.
7 BIT	° When pressed, the receive data length is set to 7 bits.
8 BIT	° When pressed, the receive data length is set to 8 bits.
	° When pressed, the screen scrolls to the right (next page) .

1.15 Menu for Setting the Receive-Data Parity

Cursor position	Sets receive-data parity	Label	PARITY (RECEIVE)
Outline	Sets the receive-data parity.		

Function key labels and explanations:

NON	° When pressed, a parity bit is not appended to the receive data.
ODD	° When pressed, an odd parity bit is appended to the receive data.
EVEN	° When pressed, an even parity bit is appended to the receive data.
	° When pressed, the screen scrolls to the right (next page).


See paragraph 2. 1
SD RD ST1 ST2 RT
103 104 113 114 115
--ERROR--
S/R
ERROR COUNT
ERROR RATIO
ES
SES
CLOCK SLIP
ELAPSED-TIME
----: --:----
DSPL MODE ELAPS
PATTERN 2↑6-1
NORMAL NO-SUP
PSL-THR AUTO
CYC-ERR 1.0E-1
CH-ERR SINGLE
ERR-INS BIT
ERROR BIT
BLK-LNG 1.0E1 BIT
MEAS MANUAL
BUZ OFF
SAV RCL
90-06-18 13:54:57
(MORE) MO1
START MEAS
START COLLECT
START CYC-ERR
START CH-ERR
PRINT OUT

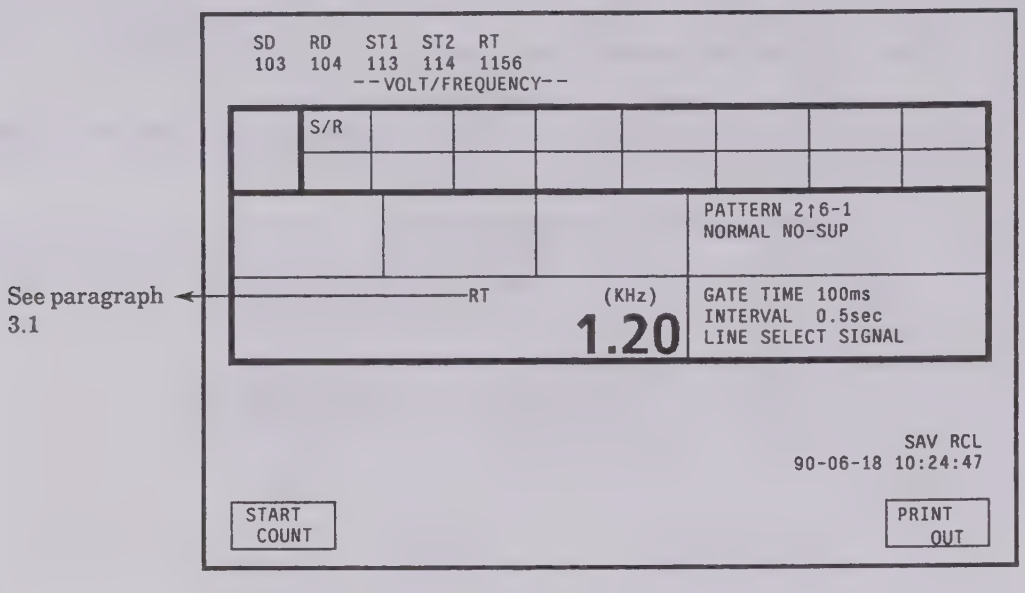
2.1 Menu for Selecting Measured-Results to be Displayed

Cursor position	Sets measured results	Label	None
Outline	Sets the measured results to be displayed.		

Function key labels and explanations:

- The menu displayed on page 4 (MO4) is shown below.

PWL (sec)	◦ When pressed, the PWL (sec) measured result is displayed.
PSL (sec)	◦ When pressed, the PSL (sec) measured result is displayed.



See paragraph 3.1

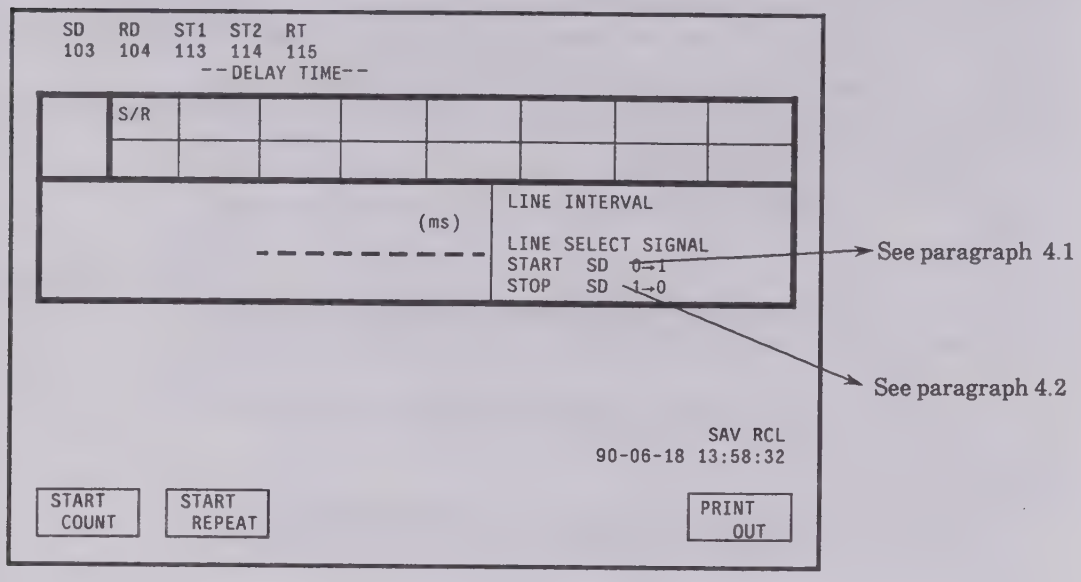
3.1 Menu for Selecting a Signal-Line for Frequency Measurement

Cursor position	Selects signal line for frequency measurement	Label	None
Outline	Selects the signal line whose frequency is to be measured.		

Function key labels and explanations:

SD	° SD is selected as the frequency measurement signal line.
RD	° RD is selected as the frequency measurement signal line.
ST1	° ST1 is selected as the frequency measurement signal line.
ST2	° ST2 is selected the frequency measurement signal line.
RT	° RT is selected as the frequency measurement signal line.
EXT	° EXT is selected as the frequency measurement signal line.

4. DELAY TIME Screen



4.1 Menu for Identifying the Signal Line to be Used as the Start Trigger in Line-Transition Delay Measurements

Cursor position	Selects the signal line to be used as the start-trigger when measuring the time difference between signal transitions	Label	START
Outline	Selects the signal line to be used as the start-trigger when measuring the time difference between signal transitions.		

Function key labels and explanations:

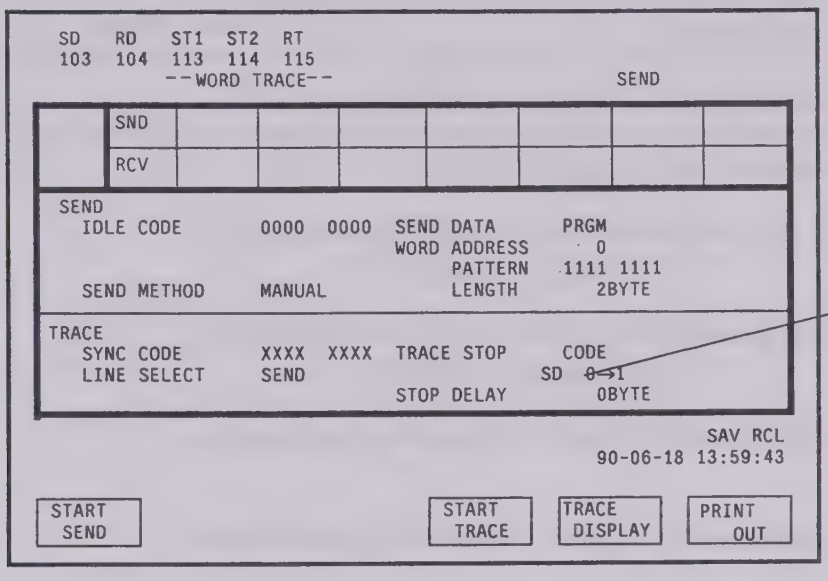
SD	° SD is selected as the start-trigger when measuring the time difference between signal transitions.
RD	° RD is selected as the start-trigger when measuring the time difference between signal transitions.
ST1	° ST1 is selected as the start-trigger when measuring the time difference between signal transitions.
ST2	° ST2 is selected as the start-trigger when measuring the time difference between signal transitions.
RT	° RT is selected as the start-trigger when measuring the time difference between signal transitions.
EXT	° EXT is selected as the start-trigger when measuring the time difference between signal transitions.

4.2 Menu for Identifying the Signal Line to be Used as the Stop Trigger in Line Transition Delay Measurements

Cursor position	Selects the signal line to be used as the stop trigger in signal line transition measurements	Label	STOP
Outline	Selects the signal line to be used as the stop trigger when measuring the time difference between signal transitions.		

Function key labels and explanations:

SD	° SD is selected as the signal line to be used as the stop trigger when measuring the time difference between signal transitions.
RD	° RD is selected as the signal line to be used as the stop trigger when measuring the time difference between signal transitions.
ST1	° ST1 is selected as the signal line to be used as the stop trigger when measuring the time difference between signal transitions.
ST2	° ST2 is selected as the signal line to be used as the stop trigger when measuring the time difference between signal transitions.
RT	° RT is selected as the signal line to be used as the stop trigger when measuring the time difference between signal transitions.
EXT	° EXT is selected as the signal line to be used as the stop trigger when measuring the time difference between signal transitions.



See paragraph 5.1

5.1 Menu for Setting the Signal-Line to be Used as the Trace Stop Trigger

Cursor position	Sets the TRACE STOP LINE and moves the cursor to the next item	Label	None
Outline	Sets the signal line to be used as the trace stop trigger.		

Function key labels and explanations:

SD
- When pressed, SD is set as the trace-stop trigger signal line.

RD
- When pressed, RD is set as the trace-stop trigger signal line.

ST1
- When pressed, ST1 is set as the trace-stop trigger signal line.

ST2
- When pressed, ST2 is set as the trace-stop trigger signal line.

RT
- When pressed, RT is set as the trace-stop trigger signal line.

APPENDIX B

REMOTE CONTROL

COMMAND REFERENCE

SUT	INTERFACE screen	

Sets interface unit No. (send)

Format	SUT n	Parameter range	0 to 5

<Details>

Switches the send interface unit No.

n :	Unit No.
0	THROUGH
1	Unit No.1
2	Unit No.2
3	Unit No.3
4	Unit No.4
5	Unit No.5

SUN	INTERFACE screen	

Sets the send interface unit

Format	SUN n	Parameter range	0 to 14

<Details>

Specifies the send interface unit.

When the type of interface unit is specified, the slot No. in which that interface unit is inserted is read automatically.

SMD	INTERFACE Screen	

Sets send-signal generation timing method

Format	SMD n	Parameter range	0, 3 to 7

<Details>

Selects the send-signal generation timing method.

n :	Signal generation timing method
0	ST1
3	ST2
4	ST2 (INV)
5	ASYNC
6	ST/SP
7	RT

SCK	INTERFACE screen	

Sets send signal clock

Format	SCK n	Parameter range	0, 1

<Details>

Switches the send signal clock.

n :	Clock
0	INTERNAL
1	EXTERNAL

Note : This can be set only when the send-signal generation timing method is ASYNC, ST/SP or ST1.

SBR	INTERFACE screen	

Sets internal-clock frequency for sending

Format	SBR n	Parameter range	50 to 8192000

<Details>

Sets the sending frequency of the internal clock (unit : b/s)

- When the send-signal generation timing method is ASYNC or ST/SP, n can be set from 50 to 20000.
- When the send-signal generation timing method is ST1, n can be set from 50 to 8192000.

Note : This can be set only when the send-signal clock (CLOCK) method is INTERNAL.

IFS	INTERFACE screen	

Sets send internal-clock slave signal

Format	IFS n	Parameter range	0 to 3

<Details>

Selects the signal to which the send internal-clock slave signal is synchronized.

n:	Frequency source
0	SELF
1	EXT1 8k
2	EXT2 64k+8k
3	RD 8k

Note : This can be set only when the send-signal clock (CLOCK) method is INTERNAL.

EI	INTERFACE screen	

Sets the signal convention for the send external-clock input interface

Format	EI n	Parameter range	0, 1

<Details>

Selects signal conventions for the send external-clock input interface.

n:	Clock
0	TTL
1	Sine wave (75Ω)

Note : This can be set only when the send signal clock (CLOCK) method is EXTERNAL.

SDL	INTERFACE Conditions Setting Screen	

Sets send-data length

Format	SDL n	Parameter range	5 to 8

<Details>

Switches the send-data length.

n:	Send-data length
5	5 BITS
6	6 BITS
7	7 BITS
8	8 BITS

Note : This can be set only when the send-signal generation timing method is ST/SP.

SPR	INTERFACE screen	
Sets send-data parity		
Format: SPR n	Parameter range: 0 to 2	

<Details>

Sets the send-data parity.

n:	Parity
0	NON
1	ODD
2	EVEN

Note : This can be set only when the send-signal generation timing method is ST/SP.

SSP	INTERFACE screen	
Sets the number of send-data stop bits		
Format: SSP n	Parameter range: 0 to 2	

<Details>

Sets the number of send-data stop bits.

n:	Number of send-data stop bits
0	1 BITS
1	1.5 BITS
2	2 BITS

Note : This can be set only when the send-signal generation timing method is ST/SP.

RUT	INTERFACE screen	

Sets interface unit No. to be used (receive)

Format	RUT n	Parameter range	0 to 5, 16

<Details>

Switches the receive interface unit.

n:	Unit No.
0	SAME
1	Unit No.1
2	Unit No.2
3	Unit No.3
4	Unit No.4
5	Unit No.5
16	SELF LOOP

RUN	INTERFACE screen	

Sets receive interface unit

Format	RUN n	Parameter range	0 to 14, 255

<Details>

Specifies the receive interface unit.

When the type of interface unit No. is specified; the slot No. into which that interface unit is inserted is read automatically.

RMD	INTERFACE screen	

Sets receive-signal generation timing method

Format	RMD n	Parameter range	3 to 6

<Details>

The receive-signal generation timing method is switched.

n:	Signal generation timing
3	RT
4	RT (INV)
5	ASYNC
6	ST/SP

RBR	INTERFACE screen	

Sets internal clock frequency for receiving

Format	RBR n	Parameter range	50 to 19200

<Details>

Sets the internal clock frequency for receiving. (unit: b/s)

Note : This can be set only when the receive-signal generation timing method is ST/SP or ASYNC.

RDL	INTERFACE screen	

Sets receive data length

Format	RDL n	Parameter range	5 to 8

<Details>

Selects the receive data length.

n:	Data length
5	5 bits
6	6 bits
7	7 bits
8	8 bits

Note : This can be set only when the receive-signal generation timing method is ST/SP.

RPR	INTERFACE screen	

Sets receive-data parity

Format	RPR n	Parameter range	0 to 2

<Details>

Selects the receive-data parity.

n:	Parity
0	NON
1	ODD
2	EVEN

Note : This can be set only when the receive-signal generation timing method is ST/SP.

DO?	INTERFACE screen	

Causes the I/F setting to be output

Format	DO?	Parameter range	None

<Details>

When this command is issued and received, the IF settings and conditions are output to the specified instrument.

When this command is selected from the I/F condition setting screen, the settings and conditions are output.

Therefore, the procedure for confirming settings is as follows:

1. Request that data be output via the DO? command.
2. READ the data to be output.
3. Output these data to the specified device.

Note : 1. Refer to the APPENDIX C REMOTE CONTROL RESPONSE DATA REFERENCE

2. If there are no settings 9999 ··· is displayed

MSL	INTERFACE screen	

Selects monitor line

Format	MSL n	Parameter range	0 to 4

<Details>

Displays the status of the signal lines.

n:	Statusm
0	Send signal status
1	Receive signal status
2	Receive data status
3	Send alarm status (same as send signal status)
4	Receive alarm status (same as receive signal status)

DSA	ERROR screen	

Selects measured result to be displayed on top left of screen

Format	DSA n	Parameter range	0 to 11, 15 to 20

<Details>

Specifies the item to be displayed in each area of the ERROR-screen.

n: Specifies item to be displayed in each field

Command	DSA	DSB	DSC	DSD	DSE
Display position	Top left side	Top right side	Middle left side	Middle right side	Bottom left side

: Item to be displayed

	0	1	2	3	4	5	6
Item to be displayed	ERROR COUNT	ERROR RATIO	BLK-ERR COUNT	BLK-ERR RATIO	ES	%ES	DM

	7	8	9	10	11	12	13
Item to be displayed	%DM	SES	%SES	US	%US		

	14	15	16	17	18	19	20
Item to be displayed		EFS	% EFS	CLOCK SLIP	PSC COUNT	PWL (sec)	PSL (sec)

	21	22	23	24	25	26	27
Item to be displayed							

	28	29	30	31	32	33	34
Item to be displayed							

DSB	ERROR screen	

Selects item to be displayed at top right of screen

Format	DSB n	Parameter range	0 to 11, 15 to 20

<Details>

Specifies the item to be displayed in each area of the ERROR-screen.

n: Specifies item to be displayed in each display field

Command	DSA	DSB	DSC	DSD	DSE
Display position	Top left side	Top right side	Middle left side	Middle right side	Bottom left side

: Item to be displayed

	0	1	2	3	4	5	6
Item to be displayed	ERROR COUNT	ERROR RATIO	BLK-ERR COUNT	BLK-ERR RATIO	ES	%ES	DM

	7	8	9	10	11	12	13
Item to be displayed	%DM	SES	%SES	US	%US		

	14	15	16	17	18	19	20
Item to be displayed		EFS	% EFS	CLOCK SLIP	PSC COUNT	PWL (sec)	PSL (sec)

	21	22	23	24	25	26	27
Item to be displayed							

	28	29	30	31	32	33	34
Item to be displayed							

DSC	ERROR screen	

Selects item to be displayed at middle left of screen

Format	DSC n	Parameter range	0 to 11, 15 to 20

<Details>

Specifies the item to be displayed in each area of ERROR-screen

n: Specifies item to be displayed in each field

Command	DSA	DSB	DSC	DSD	DSE
Display position	Top left side	Top right side	Middle left side	Middle right side	Bottom left side

: Item to be displayed

	0	1	2	3	4	5	6
Item to be displayed	ERROR COUNT	ERROR RATIO	BLK-ERR COUNT	BLK-ERR RATIO	ES	%ES	DM

	7	8	9	10	11	12	13
Item to be displayed	%DM	SES	%SES	US	%US		

	14	15	16	17	18	19	20
Item to be displayed		EFS	% EFS	CLOCK SLIP	PSC COUNT	PWL (sec)	PSL (sec)

	21	22	23	24	25	26	27
Item to be displayed							

	28	29	30	31	32	33	34
Item to be displayed							

DSD	ERROR screen	

Selects the item to be displayed at the middle right of the screen

Format	DSD n	Parameter range	0 to 11, 15 to 20

<Details>

Specifies the item to be displayed in each area of the ERROR-screen.

n: Specifies item to be displayed in each display field

Command	DSA	DSB	DSC	DSD	DSE
Display position	Top left side	Top right side	Middle left side	Middle right side	Bottom left side

: Item to be displayed

	0	1	2	3	4	5	6
Item to be displayed	ERROR COUNT	ERROR RATIO	BLK-ERR COUNT	BLK-ERR RATIO	ES	%ES	DM

	7	8	9	10	11	12	13
Item to be displayed	%DM	SES	%SES	US	%US		

	14	15	16	17	18	19	20
Item to be displayed		EFS	% EFS	CLOCK SLIP	PSC COUNT	PWL (sec)	PSL (sec)

	21	22	23	24	25	26	27
Item to be displayed							

	28	29	30	31	32	33	34
Item to be displayed							

DSE	ERROR screen	

Selects item to be displayed at bottom left of screen

Format	DSE n	Parameter range	0 to 11, 15 to 20

<Details>

Specifies the item to be displayed in each area of the ERROR-screen.

n: Specifies item to be displayed in each display field

Command	DSA	DSB	DSC	DSD	DSE
Display position	Top left side	Top right side	Middle left side	Middle right side	Bottom left side

: Item to be displayed

	0	1	2	3	4	5	6
Item to be displayed	ERROR COUNT	ERROR RATIO	BLK-ERR COUNT	BLK-ERR RATIO	ES	%ES	DM

	7	8	9	10	11	12	13
Item to be displayed	%DM	SES	%SES	US	%US		

	14	15	16	17	18	19	20
Item to be displayed		EFS	% EFS	CLOCK SLIP	PSC COUNT	PWL (sec)	PSL (sec)

	21	22	23	24	25	26	27
Item to be displayed							

	28	29	30	31	32	33	34
Item to be displayed							

OFA	ERROR screen	

Specifies output format of alarm data

Format	OFA n, n, n.. (Total 19)	Parameter range	0, 1

<Details>

Specifies the output format of alarm data (e.g. output data, data sequence).

- Up to 14 parameters can be specified.
- The items and sequence of data output by the DOA? and DRA? commands are determined by this command.
- n: Output contents

n	0	1
Alarm	PWL	PSL

FM	VOLT/FREQUENCY screen	

Sets frequency measurement line

Format	FM n	Parameter range	0 to 4, 13

<Details>

Selects the line whose frequency is to be measured.

n: Measurement line

n	0	1	2	3	4	13
Signal	SD	RD	ST1	ST2	RT	EXT

SAL	DELAY TIME screen	

Sets start signal line and trigger condition

Format	SAL n, m	Parameter range	n: 0 to 4, 13 m: 0, 1

<Details>

Sets the START LINE and trigger condition which are used when the measurement mode is LINE INTERVAL.

n: Signal line No.

m: 0=1→0, ON→OFF, H→L 1=0→1, OFF→ON, L→H

n	0	1	2	3	4	13
Signal	SD	RD	ST1	ST2	RT	EXT

Note : When the signal line is SD or RD, m is either 0 or 1 ; and when the signal line is EXT, m is either L or H.

Otherwise, m is OFF or ON.

SOL	DELAY TIME screen	

Sets stop signal line and trigger condition

Format	SOL n, m	Parameter range	n: 0 to 4, 13 m: 0, 1

<Details>

Sets the START LINE and trigger condition when the measurement mode is LINE INTERVAL.

n: Signal line No..

m: 0=1→0, ON→OFF, H→L 1=0→1, OFF→ON, L→H

n	0	1	2	3	4	13
Signal	SD	RD	ST1	ST2	RT	EXT

Note : When the signal is SD or RD, m is either 0 or 1 ; and when the signal line is EXT, m is either L or H.

Otherwise, it is OFF or ON.

SL	WORD TRACE screen	

Sets the condition and signal line to be used as the trace stop trigger

Format	SL n, m	Parameter range	n: 0 to 4 m: 0, 1

<Details>

Sets the trace-stop-trigger signal line and trigger condition.

n: Signal line No.

m: 0=1→0, ON→OFF, 1=0→1, OFF→ON

n	0	1	2	3	4
Signal	SD	RD	ST1	ST2	RT

Note : When the signal line is SD or RD, m is either 0 or 1.
Otherwise, it is OFF or ON.

APPENDIX C

REMOTE CONTROL

RESPONSE DATA REFERENCE

INTERFACE UNIT RESPONSE DATA

Screen	INTERFACE screen		
Command name	DO ?	Explanation	Requests data output

Output format and explanations:

```
IF  0△ 90,   03,  19,   17, 47,  40,   3,  10, △10,  0,  0,
1   2  3     4    5     6   7    8    9   10   11   12  13
△△△1200, 0, 9, 9, 9, 9,
14       15 16 17 18 19
△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△
20
△△△△△△△△△△△△△△△△△△△△△△, 3, 10, △10, 3, △1200, 9, 9, △△△△△△△
                                  21 22   23  24    25   26 27  28
△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△△
△△△△△△△△△△△△△△△△△
```

NO	Output	Column	Number of columns	Range	Remarks
1	Screen symbol	1,2	2	Constant (No range)	
2	Data type	3	1	Constant (No range)	
3~5	Year, month, and day of data output	5~12	8	00,01,01~99,12,31	
6~8	Hours, minutes, and seconds of data output	14~21	8	00,00,00~23,59,59	
9	Send interface slot No.	23	1	1 ~ 5	
10	Send interface unit ID	25,26	2	Constant (No range)	
11	Send interface	28~30	3	Constant (No range)	
12	Send timing	32	1	ST1 : 0 ST2 : 3 ST2 (INV) : 4 ASYNC :5 ST / SP : 6 RT : 7	
13	Send signal clock type	34	1	INT : 0 EXT : 1	Invalid : 9
14	Send data bit rate	36~42	7	50 b / s : △△△50 〈 8792 kb / s : 8192000	Invalid :99999
15	Send Internal clock	44	1	SELF : 0 EXT1 8 k : 1 EXT2 64 k + 8 k : 2 RD 8 k : 3	Invalid : 9
16	Send external clock	46	1	TTL : 0 75 Ω : 1	Invalid : 9
17	Send data length	48	1	5 bit : 5 6 bit : 6 7 bit : 7 8 bit : 8	Invalid : 9
18	Send parity	50	1	NON : 0 ODD : 1 EVEN : 2	Invalid : 9
19	Send stop bit	52	1	1 bit : 0 1.5 bit : 1 2 bit : 2	Invalid : 9

NO	Output	Column	Number of columns	Range	Remarks
20	100 bytes of memory space remaining	54~122	69	69 bytes of memory space remaining	
21	Receive interface slot No.	124	1	1 ~ 5	
22	Receive interface unit ID	126,127	2	Constant	
23	Receive interface	129~131	3	TTL : △10 SELF LOOP : 255	
24	Receive timing	133	1	RT : 3 RT (INV) : 4 ASYNC : 5 ST / SP : 6	
25	Receive data bit rate	135~139	5	50 b / s : △△△50 19200 b / s : 19200	Invalid : 9
26	Receive data length	141	1	5 bit : 5 6 bit : 6 7 bit : 7 8 bit : 8	Invalid : 9
27	Receive parity	143	1	NON : 0 ODD : 1 EVEN : 2	Invalid : 9
28	100-bytes of memory space remaining	145~223	79	79 bytes of memory space remaining	

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